# Direct Operated 2 Port Solenoid Valve New

Air | Medium vacuum | Water | Oil | Steam

* Can be used with heated water.

Note) For air and water only

RoHS

## Large flow rate

**Flow rate**

**20% More flow***

(Size 1)

## Compact

**Height**

**10% Smaller***

(Size 1)

## Lightweight

**Weight**

**30% Lighter***

(Size 1, Aluminum body)

* Comparison with SMC conventional model

Conventional model

New VX




### Body material

**Air**
Aluminum, Resin

**Water/Oil/ Medium vacuum/Steam**
C37 (Brass), Stainless steel

### Enclosure

**IP65***

* Electrical entry Flat terminal type terminal is IP40.

With One-touch fittings (Resin body)




### Power consumption

**4.5 W** (Size 1)
**7 W** (Size 2)
**10.5 W** (Size 3)
**(DC/N.C. valve)**

### Manifold

Air | Medium vacuum

**Material**
- Body/PPS
- Base/Aluminum
- Seal/NBR, FKM



### Solenoid coil type

- Insulation type Class B/H
- Fluid temperature
  Class B/Max. 60°C
  Class H/Max. 183°C




### Valve type

N.C. N.O.



## Series VX21/22/23

SMC

CAT.ES70-44D

# Direct Operated 2 Port Solenoid Valve

Air | Medium vacuum | Water | Oil | Steam
* Can be used with heated water.

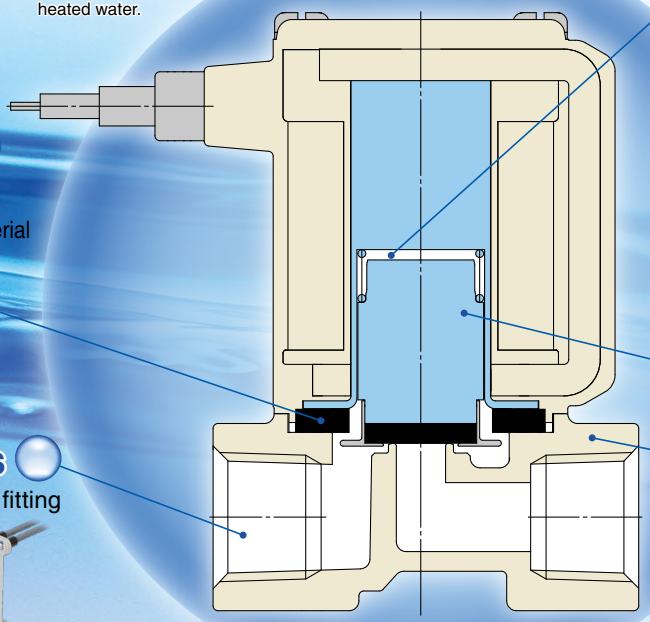
## Enclosure
IP65

## Flame resistance
UL94V-0 conformed
Flame resistant mold coil material

## Low-noise construction
Metal noise reduced by the rubber bumper

## Piping variations
Thread piping, One-touch fitting





## Clearance
By providing a bumper and clearance, we reduced the collision sound of the core when ON (when the valve is open). Because of the clearance, when using highly viscous fluids such as oil, the armature does not get stuck and the responsiveness when OFF (when the valve is closed) is improved.

## Power consumption
* DC/Class B, N.C. valve
**4.5** W (Size 1)
**7** W (Size 2)
**10.5** W (Size 3)

## Improved armature durability

## Body material
**Air** Aluminum, Resin
**Water/ Oil/ Medium vacuum/ Steam** C37 (Brass), Stainless steel

## Full-wave rectifier type (AC specification: Insulation type Class B/H)

### Improved durability
Service life is extended by the special construction. (compared with current shading coil)

### Reduced buzz noise
Rectified to DC by the full-wave rectifier, resulting in a buzz noise reduction.

### Reduced apparent power * Class B, N.C. valve
10 VA→**7** VA (Size 1)  20 VA→**9.5** VA (Size 2)
32 VA→**12** VA (Size 3)

### Improved OFF response
Specially constructed to improve the OFF response when operated with a higher viscosity fluid such as oil.

### Low-noise construction
Specially constructed to reduce the metal noise during operation.

## Variations

**<Fluid>**

| Model | Applicable fluid *1 (* Can be used with heated water.) | | | | |
|---|---|---|---|---|---|
| | Air | Medium vacuum | Water | Oil | Steam |
| For Air **VX2□0** Page 5 | ● | — | — | — | — |
| For Medium vacuum **VX2□4** Page 10 | ●*2 | ● | — | — | — |
| For Water **VX2□2** Page 14 | ●*2 | — | ● | — | — |
| For Oil **VX2□3** Page 16 | ●*2 | — | ●*2 | ● | — |
| For Steam * Can be used with heated water. **VX2□5** Page 18 | ●*2 | — | ●*2 | ●*2 | ● |



*1 For details, refer to pages 45 and 46. *2 Refer to the individual specifications for each fluid.

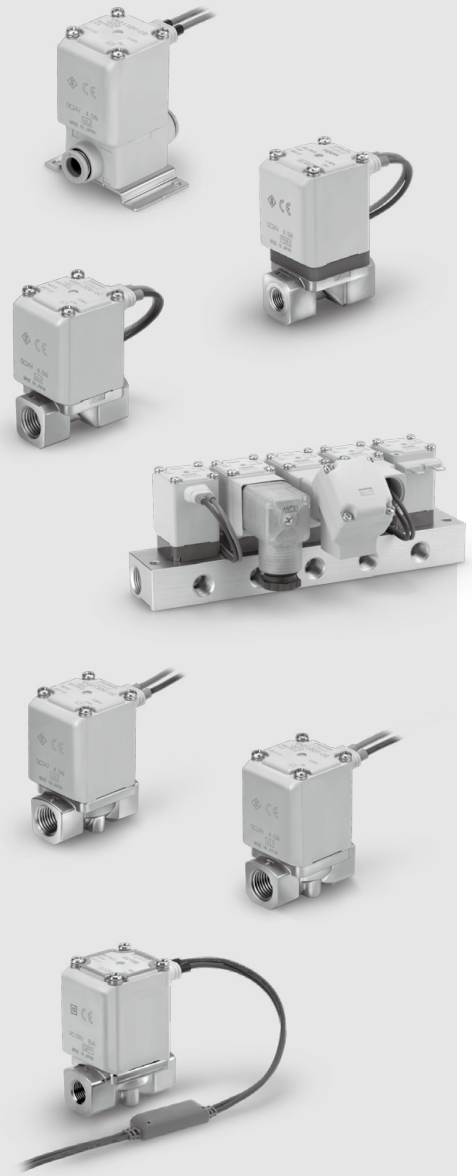
**<Body Size>**

| Model | Body size | Orifice diameter | | | | | | | Port size |
|---|---|---|---|---|---|---|---|---|---|
| | | 2 mmø | 3 mmø | 4 mmø | 5 mmø | 7 mmø | 8 mmø | 10 mmø Note) | |
| **VX2$^{1}_{4}$** | **Size 1** | ● | ● | — | ● | — | — | — | 1/8, 1/4 One-touch fitting: ø6, ø8 |
| **VX2$^{2}_{5}$** | **Size 2** | — | — | ● | — | ● | — | — | 1/4, 3/8 One-touch fitting: ø8, ø10 |
| **VX2$^{3}_{6}$** | **Size 3** | — | — | — | ● | — | ● | ● | 1/4, 3/8, 1/2 One-touch fitting: ø10, ø12 |

Note) N.C. only

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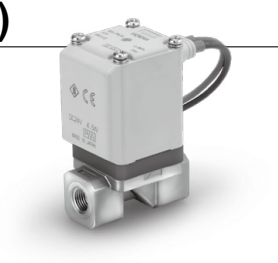
# Direct Operated 2 Port Solenoid Valve

# *Series VX21/22/23*

**For Air, Medium Vacuum, Water, Oil and Steam**

## Variations

### Single Unit (For Air, Medium Vacuum, Water, Oil and Steam)



**■ Valve type**

Normally Closed (N.C.)
Normally Open (N.O.)

**■ Solenoid coil type**

Insulation type: Class B, Class H

**■ Rated voltage**

100 V/200 V/110 V/230 VAC
(220 V/240 V/48 V/24 VAC)
24 VDC (12 VDC)

Voltage in ( ) indicates special voltage.

**■ Material**

Body — Aluminum, Resin, C37 (Brass), Stainless steel
Seal — NBR, FKM*

* Refer to individual pages for details of each fluid.

**■ Electrical entry**

- Grommet
- Conduit
- DIN terminal
- Conduit terminal
- Flat terminal

**Normally Closed (N.C.)** **Normally Open (N.O.)**

| Size | | Size 1 | Size 2 | Size 3 |
|---|---|---|---|---|
| Orifice diameter | 2 mmø | ● | — | — |
| | 3 mmø | ● | — | — |
| | 4 mmø | — | ● | — |
| | 5 mmø | ● | — | ● |
| | 7 mmø | — | ● | — |
| | 8 mmø | — | — | ● |
| | 10 mmø | — | — | ●* |
| Port size | | 1/8, 1/4<br>ø6, ø8 | 1/4, 3/8<br>ø8, ø10 | 1/4, 3/8, 1/2<br>ø10, ø12 |

* N.C. only

### Manifold (For Air, Medium Vacuum)



**■ Valve type**

Normally Closed (N.C.)
Normally Open (N.O.)

**■ Manifold type**

Common SUP type
Individual SUP type

**■ Solenoid coil type**

Insulation type: Class B

**■ Rated voltage**

100 V/200 V/110 V/230 VAC
(220 V/240 V/48 V/24 VAC)
24 VDC (12 VDC)

Voltage in ( ) indicates special voltage.

**■ Material**

Body — Resin
Base — Aluminum
Seal — NBR, FKM

**■ Electrical entry**

- Grommet
- Conduit
- DIN terminal
- Conduit terminal
- Flat terminal

**Manifold**

| Size | | | Size 1 | Size 2 | Size 3 |
|---|---|---|---|---|---|
| Orifice diameter | | 2 mmø | ● | — | — |
| | | 3 mmø | ● | — | — |
| | | 4 mmø | — | ● | — |
| | | 5 mmø | ● | — | ● |
| | | 7 mmø | — | ● | ● |
| Port size | Common SUP type (Air) | IN | 3/8 | | |
| | | OUT | 1/8, 1/4 | | |
| | Individual SUP type (Medium vacuum) | IN | 1/8, 1/4 | | |
| | | OUT | 3/8 | | |

# Series VX21/22/23
# Common Specifications

## Standard Specifications

| | | | |
|---|---|---|---|
| Valve specifications | Valve construction | | Direct operated poppet |
| | Withstand pressure | | 2.0 MPa (Resin body type 1.5 MPa) |
| | Body material | | Aluminum, Resin, C37 (Brass), Stainless steel |
| | Seal material Note 3) | | NBR, FKM |
| | Enclosure | | Dust-tight, Water-jet-proof type (IP65) Note 1) |
| | Environment | | Location without corrosive or explosive gases |
| Coil specifications | Rated voltage | AC | 100 VAC, 200 VAC, 110 VAC, 230 VAC, (220 VAC, 240 VAC, 48 VAC, 24 VAC) Note 2) |
| | | DC | 24 VDC, (12 VDC) Note 2) |
| | Allowable voltage fluctuation | | ±10% of rated voltage |
| | Allowable leakage voltage | AC | 5% or less of rated voltage |
| | | DC | 2% or less of rated voltage |
| | Coil insulation type | | Class B, Class H |

Note 1) Electrical entry flat terminal type terminal is IP40.
Note 2) Voltage in ( ) indicates special voltage. (Refer to page 21.)
Note 3) For seal material/EPDM, refer to X332. (Refer to page 23.)

⚠ **Be sure to read "Specific Product Precautions" before handling.**

## Solenoid Coil Specifications

### Normally Closed (N.C.)

#### DC Specification

**Class B**

| Size | Power consumption (W) Note 1) | Temperature rise (°C) Note 2) |
|---|---|---|
| **Size 1** | 4.5 | 50 |
| **Size 2** | 7 | 55 |
| **Size 3** | 10.5 | 65 |

**Class H**

| Size | Power consumption (W) Note 1) | Temperature rise (°C) Note 2) |
|---|---|---|
| **Size 1** | 9 | 100 |
| **Size 2** | 12 | 100 |
| **Size 3** | 15 | 100 |

Note 1) Power consumption: The value at ambient temperature of 20°C and when the rated voltage is applied. (Variation: ±10%)
Note 2) The value at ambient temperature of 20°C and when the rated voltage is applied. The value depends on the ambient environment. This is for reference.

#### AC Specification (Built-in Full-wave Rectifier Type)

**Class B**

| Size | Apparent power (VA) Note 1) 2) | Temperature rise (°C) Note 3) |
|---|---|---|
| **Size 1** | 7 | 60 |
| **Size 2** | 9.5 | 70 |
| **Size 3** | 12 | 70 |

**Class H**

| Size | Apparent power (VA) Note 1) 2) | Temperature rise (°C) Note 3) |
|---|---|---|
| **Size 1** | 9 | 100 |
| **Size 2** | 12 | 100 |
| **Size 3** | 15 | 100 |

Note 1) Apparent power: The value at ambient temperature of 20°C and when the rated voltage is applied. (Variation: ±10%)
Note 2) There is no difference in the frequency and the inrush and energized apparent power, since a rectifying circuit is used in the AC.
Note 3) The value at ambient temperature of 20°C and when the rated voltage is applied. The value depends on the ambient environment. This is for reference.

### Normally Open (N.O.)

#### DC Specification

**Class B**

| Size | Power consumption (W) Note 1) | Temperature rise (°C) Note 2) |
|---|---|---|
| **Size 1** | 7.5 | 60 |
| **Size 2** | 8.5 | 70 |
| **Size 3** | 12.5 | 70 |

**Class H**

| Size | Power consumption (W) Note 1) | Temperature rise (°C) Note 2) |
|---|---|---|
| **Size 1** | 9 | 100 |
| **Size 2** | 12 | 100 |
| **Size 3** | 15 | 100 |

Note 1) Power consumption: The value at ambient temperature of 20°C and when the rated voltage is applied. (Variation: ±10%)
Note 2) The value at ambient temperature of 20°C and when the rated voltage is applied. The value depends on the ambient environment. This is for reference.

#### AC Specification (Built-in Full-wave Rectifier Type)

**Class B**

| Size | Apparent power (VA) Note 1) 2) | Temperature rise (°C) Note 3) |
|---|---|---|
| **Size 1** | 9 | 60 |
| **Size 2** | 10 | 70 |
| **Size 3** | 14 | 70 |

**Class H**

| Size | Apparent power (VA) Note 1) 2) | Temperature rise (°C) Note 3) |
|---|---|---|
| **Size 1** | 9 | 100 |
| **Size 2** | 12 | 100 |
| **Size 3** | 15 | 100 |

Note 1) Apparent power: The value at ambient temperature of 20°C and when the rated voltage is applied. (Variation: ±10%)
Note 2) There is no difference in the frequency and the inrush and energized apparent power, since a rectifying circuit is used in the AC.
Note 3) The value at ambient temperature of 20°C and when the rated voltage is applied. The value depends on the ambient environment. This is for reference.

# Selection Steps

## Selection Steps

**Step 1** **Select the fluid.**

| Item | Selection item | Page | Symbol | |
|---|---|---|---|---|
| Select the fluid. | Air | Page 5, 6 | 0 | ❶ |
| | Water | Page 14 | 2 | |
| | Oil | Page 16 | 3 | |
| | Medium vacuum | Page 10 | 4 | |
| | Steam ※ Can be used with heated water. | Page 18 | 5 | |

VX2 3 **0** A A
❶

**Step 2** **Select "Body material", "Port size" and "Orifice diameter" from "Flow rate — Pressure" of each fluid.**

| Item | Selection item | | Symbol | |
|---|---|---|---|---|
| Select from "Flow rate — Pressure."<br>● Body material<br>● Port size<br>● Orifice diameter | Size | Size 3 | 3 | ❷ |
| | Body material | Aluminum | A | ❸ |
| | Port size | 1/8 | | |
| | Orifice diameter | 2 | | |

VX2 **3** 0 **A** A
❷ ❸

**Step 3** **Select electrical specification.**

| Item | Selection item | | Symbol | |
|---|---|---|---|---|
| Select electrical specification. | Voltage | 24 VDC | A | ❹ |
| | Electrical entry | Grommet | | |

VX2 3 0 A **A**
❹

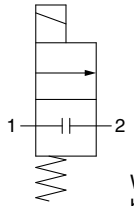
**Step 4** **For special options, refer to pages 21 to 23.**

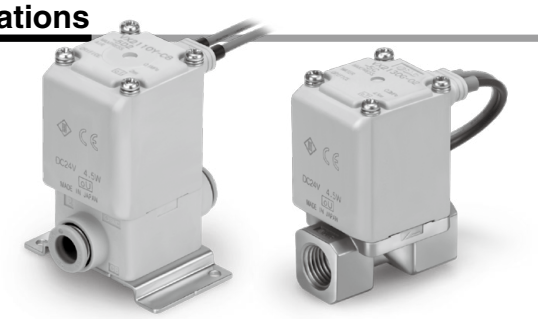
# For Air Single Unit

## Model/Valve Specifications

**N.C.**

**Symbol**



When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

### Aluminum Body Type

| Size | Port size | Orifice diameter (mmø) | Model | Flow-rate characteristics | | | Maximum operating pressure differential (MPa) | Max. system pressure (MPa) | Weight Note) (g) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | C [dm³/(s·bar)] | b | Cv | | | |
| 1 | 1/8, 1/4 | 2 | VX210 | 0.63 | 0.63 | 0.23 | 1.0 | 1.0 | 220 |
| | | 3 | | 1.05 | 0.68 | 0.41 | 0.6 | | 220 |
| | | 5 | | 2.20 | 0.39 | 0.62 | 0.2 | | 220 |
| 2 | 1/4, 3/8 | 4 | VX220 | 1.90 | 0.52 | 0.62 | 1.0 | | 340 |
| | | 7 | | 3.99 | 0.44 | 1.08 | 0.15 | | 340 |
| 3 | 1/4, 3/8 | 5 | VX230 | 1.96 | 0.55 | 0.75 | 1.0 | | 450 |
| | | 8 | | 5.67 | 0.33 | 1.58 | 0.3 | | 450 |
| | | 10 | | 5.74 | 0.64 | 2.21 | 0.1 | | 450 |
| | 1/2 | 10 | | 8.42 | 0.39 | 2.21 | 0.1 | | 470 |

### Resin Body Type (Built-in One-touch Fittings)

| Size | Port size | Orifice diameter (mmø) | Model | Flow-rate characteristics | | | Maximum operating pressure differential (MPa) | Max. system pressure (MPa) | Weight Note) (g) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | C [dm³/(s·bar)] | b | Cv | | | |
| 1 | ø6 | 2 | VX210 | 0.82 | 0.44 | 0.23 | 1.0 | 1.0 | 220 |
| | | 3 | | 1.25 | 0.34 | 0.35 | 0.6 | | 220 |
| | | 5 | | 1.45 | 0.43 | 0.40 | 0.2 | | 220 |
| | ø8 | 2 | | 0.82 | 0.44 | 0.23 | 1.0 | | 220 |
| | | 3 | | 1.81 | 0.40 | 0.41 | 0.6 | | 220 |
| | | 5 | | 2.11 | 0.32 | 0.56 | 0.2 | | 220 |
| 2 | ø8 | 4 | VX220 | 1.69 | 0.40 | 0.47 | 1.0 | | 340 |
| | | 7 | | 3.14 | 0.34 | 0.84 | 0.15 | | 340 |
| | ø10 | 4 | | 1.68 | 0.49 | 0.50 | 1.0 | | 340 |
| | | 7 | | 3.54 | 0.36 | 0.90 | 0.15 | | 340 |
| 3 | ø10 | 5 | VX230 | 2.50 | 0.44 | 0.70 | 1.0 | | 460 |
| | | 8 | | 2.77 | 0.82 | 1.22 | 0.3 | | 460 |
| | | 10 | | 5.69 | 0.46 | 1.54 | 0.1 | | 460 |
| | ø12 | 5 | | 2.50 | 0.44 | 0.70 | 1.0 | | 460 |
| | | 8 | | 2.56 | 0.88 | 1.38 | 0.3 | | 460 |
| | | 10 | | 5.69 | 0.64 | 1.76 | 0.1 | | 460 |

Note) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.

- Refer to "Glossary of Terms" on page 37 for details on the maximum operating pressure differential.

## Fluid and Ambient Temperature

| Fluid temperature (°C) | Ambient temperature (°C) |
|---|---|
| −10 Note) to 60 | −20 to 60 |

Note) Dew point temperature: −10°C or less

## Valve Leakage Rate

### Internal Leakage

| Seal material Note 2) | Leakage rate (Air) Note 1) |
|---|---|
| NBR (FKM) | 1 cm³/min or less (Aluminum body type) |
| | 15 cm³/min or less (Resin body type) |

### External Leakage

| Seal material Note 2) | Leakage rate (Air) Note 1) |
|---|---|
| NBR (FKM) | 1 cm³/min or less (Aluminum body type) |
| | 15 cm³/min or less (Resin body type) |

Note 1) Leakage is the value at ambient temperature 20°C.

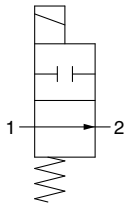
Note 2) For seal material/FKM, refer to "Other Options" on page 21 for the selection.

# For Air Single Unit

## Model/Valve Specifications

**N.O.**

**Symbol**






When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

### Aluminum Body Type

| Size | Port size | Orifice diameter (mmø) | Model | Flow-rate characteristics | | | Maximum operating pressure differential (MPa) | Max. system pressure (MPa) | Weight Note) (g) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | C [dm³/(s·bar)] | b | Cv | | | |
| 1 | 1/8, 1/4 | 2 | VX240 | 0.63 | 0.63 | 0.23 | 0.9 | 1.0 | 240 |
| | | 3 | | 1.05 | 0.68 | 0.41 | 0.45 | | 240 |
| | | 5 | | 2.20 | 0.39 | 0.62 | 0.2 | | 240 |
| 2 | 1/4, 3/8 | 4 | VX250 | 1.90 | 0.52 | 0.62 | 0.8 | | 370 |
| | | 7 | | 3.99 | 0.44 | 1.08 | 0.15 | | 370 |
| 3 | 1/4, 3/8 | 5 | VX260 | 1.96 | 0.55 | 0.75 | 0.8 | | 490 |
| | | 8 | | 5.67 | 0.33 | 1.58 | 0.3 | | 490 |

### Resin Body Type (Built-in One-touch Fittings)

| Size | Port size | Orifice diameter (mmø) | Model | Flow-rate characteristics | | | Maximum operating pressure differential (MPa) | Max. system pressure (MPa) | Weight Note) (g) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | C [dm³/(s·bar)] | b | Cv | | | |
| 1 | ø6 | 2 | VX240 | 0.82 | 0.44 | 0.23 | 0.9 | 1.0 | 240 |
| | | 3 | | 1.25 | 0.34 | 0.35 | 0.45 | | 240 |
| | | 5 | | 1.45 | 0.43 | 0.40 | 0.2 | | 240 |
| | ø8 | 2 | | 0.82 | 0.44 | 0.23 | 0.9 | | 240 |
| | | 3 | | 1.81 | 0.40 | 0.41 | 0.45 | | 240 |
| | | 5 | | 2.11 | 0.32 | 0.56 | 0.2 | | 240 |
| 2 | ø8 | 4 | VX250 | 1.69 | 0.40 | 0.47 | 0.8 | | 370 |
| | | 7 | | 3.14 | 0.34 | 0.84 | 0.15 | | 370 |
| | ø10 | 4 | | 1.68 | 0.49 | 0.50 | 0.8 | | 370 |
| | | 7 | | 3.54 | 0.36 | 0.90 | 0.15 | | 370 |
| 3 | ø10 | 5 | VX260 | 2.50 | 0.44 | 0.70 | 0.8 | | 500 |
| | | 8 | | 2.77 | 0.82 | 1.22 | 0.3 | | 500 |
| | ø12 | 5 | | 2.50 | 0.42 | 0.70 | 0.8 | | 500 |
| | | 8 | | 2.56 | 0.88 | 1.38 | 0.3 | | 500 |

Note) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.

- Refer to "Glossary of Terms" on page 37 for details on the maximum operating pressure differential.

## Fluid and Ambient Temperature

| Fluid temperature (°C) | Ambient temperature (°C) |
|---|---|
| −10 Note) to 60 | −20 to 60 |

Note) Dew point temperature: −10°C or less

## Valve Leakage Rate

### Internal Leakage

| Seal material Note 2) | Leakage rate (Air) Note 1) |
|---|---|
| NBR (FKM) | 1 cm³/min or less (Aluminum body type) |
| | 15 cm³/min or less (Resin body type) |

### External Leakage

| Seal material Note 2) | Leakage rate (Air) Note 1) |
|---|---|
| NBR (FKM) | 1 cm³/min or less (Aluminum body type) |
| | 15 cm³/min or less (Resin body type) |

Note 1) Leakage is the value at ambient temperature 20°C.

Note 2) For seal material/FKM, refer to "Other Options" on page 21 for the selection.

## How to Order (Single Unit)

Note) Refer to the table on page 24 for UL-compliant.

RoHS

**VX2 1 0 A A**

**Fluid**

| | |
|---|---|
| 0 | Air |

**Common Specifications**

| | |
|---|---|
| Seal material | NBR |
| Coil insulation type | Class B |
| Thread type | Rc* |

* One-touch fittings are attached to the resin body type.

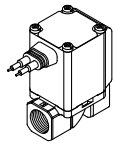
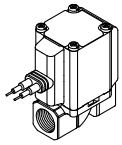
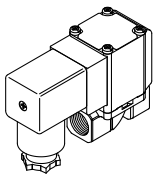
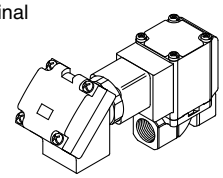
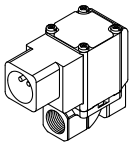
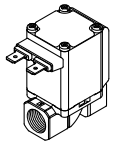
### Coil size/Valve type

| Size | Symbol | Valve type |
|---|---|---|
| Size 1 | 1 | N.C. |
| | 4 | N.O. |
| Size 2 | 2 | N.C. |
| | 5 | N.O. |
| Size 3 | 3 | N.C. |
| | 6 | N.O. |

### Body material/Port size/Orifice diameter

| Symbol | Body material | Port size | Orifice diameter |
|---|---|---|---|
| A | Aluminum | 1/8 | 2 |
| B | | | 3 |
| C | | | 5 |
| D | | 1/4 | 2 |
| E | | | 3 |
| F | | | 5 |
| H | Resin (With bracket) | ø6 | 2 |
| J | | | 3 |
| K | | | 5 |
| L | | ø8 | 2 |
| M | | | 3 |
| N | | | 5 |
| A | Aluminum | 1/4 | 4 |
| B | | | 7 |
| D | | 3/8 | 4 |
| E | | | 7 |
| H | Resin (With bracket) | ø8 | 4 |
| J | | | 7 |
| L | | ø10 | 4 |
| M | | | 7 |
| A | Aluminum | 1/4 | 5 |
| B | | | 8 |
| C | | | 10 (N.C. only) |
| D | | 3/8 | 5 |
| E | | | 8 |
| F | | | 10 (N.C. only) |
| G | | 1/2 | 10 (N.C. only) |
| H | Resin (With bracket) | ø10 | 5 |
| J | | | 8 |
| K | | | 10 (N.C. only) |
| L | | ø12 | 5 |
| M | | | 8 |
| N | | | 10 (N.C. only) |

### Voltage/Electrical entry

| Symbol | Voltage | Electrical entry |
|---|---|---|
| A | 24 VDC | Grommet  |
| B | 100 VAC | Grommet (With surge voltage suppressor)  |
| C | 110 VAC | |
| D | 200 VAC | |
| E | 230 VAC | |
| F | 24 VDC | |
| G | 24 VDC | DIN terminal (With surge voltage suppressor)  |
| H | 100 VAC | |
| J | 110 VAC | |
| K | 200 VAC | |
| L | 230 VAC | |
| M | 24 VDC | Conduit terminal (With surge voltage suppressor)  |
| N | 100 VAC | |
| P | 110 VAC | |
| Q | 200 VAC | |
| R | 230 VAC | |
| S | 24 VDC | Conduit (With surge voltage suppressor)  |
| T | 100 VAC | |
| U | 110 VAC | |
| V | 200 VAC | |
| W | 230 VAC | |
| Y | 24 VDC | Flat terminal  |
| Z | Other voltages | |

**For special options, refer to pages 21 to 23.**

| | |
|---|---|
| Special voltage | 24 VAC |
| | 48 VAC |
| | 220 VAC |
| | 240 VAC |
| | 12 VDC |
| DIN terminal with light | |
| Conduit terminal with light | |
| Without DIN connector | |

| |
|---|
| Low concentration ozone resistant (Seal material: FKM) |
| Seal material: EPDM |
| Oil-free |
| G thread |
| NPT thread |
| With bracket (Aluminum body only) |
| Mounting holes on the bottom side of the body (Aluminum body only) |
| Special electrical entry direction |

Dimensions → Pages 28 to 31 (Single unit)

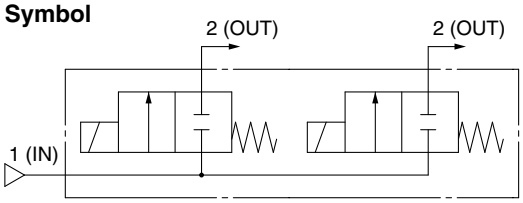
# For Air Manifold

∗ For other fluids, please contact SMC.

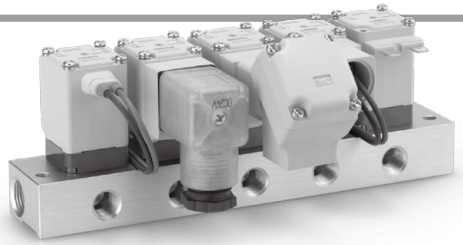
## Model/Valve Specifications

**N.C.**

**Symbol**

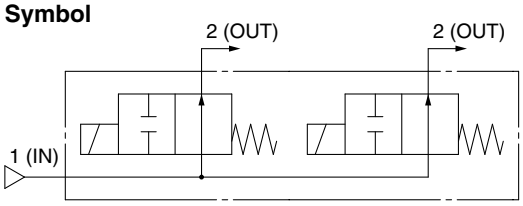



**Common SUP type**



**N.O.**

**Symbol**




**Common SUP type**

When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

### Normally Closed (N.C.)

| Size | Orifice diameter (mmø) | Model | Flow-rate characteristics | | | Maximum operating pressure differential (MPa) | Max. system pressure (MPa) |
|---|---|---|---|---|---|---|---|
| | | | C [dm³/(s·bar)] | b | Cv | | |
| 1 | 2 | VX2A0 | 0.63 | 0.63 | 0.23 | 1.0 | 1.0 |
| | 3 | | 1.05 | 0.68 | 0.41 | 0.6 | |
| | 5 | | 2.20 | 0.39 | 0.62 | 0.2 | |
| 2 | 4 | VX2B0 | 1.90 | 0.52 | 0.62 | 1.0 | |
| | 7 | | 3.99 | 0.44 | 1.08 | 0.15 | |
| 3 | 5 | VX2C0 | 1.96 | 0.55 | 0.75 | 1.0 | |
| | 7 | | 3.99 | 0.44 | 1.08 | 0.3 | |

### Normally Open (N.O.)

| Size | Orifice diameter (mmø) | Model | Flow-rate characteristics | | | Maximum operating pressure differential (MPa) | Max. system pressure (MPa) |
|---|---|---|---|---|---|---|---|
| | | | C [dm³/(s·bar)] | b | Cv | | |
| 1 | 2 | VX2D0 | 0.63 | 0.63 | 0.23 | 0.9 | 1.0 |
| | 3 | | 1.05 | 0.68 | 0.41 | 0.45 | |
| | 5 | | 2.20 | 0.39 | 0.62 | 0.2 | |
| 2 | 4 | VX2E0 | 1.90 | 0.52 | 0.62 | 0.8 | |
| | 7 | | 3.99 | 0.44 | 1.08 | 0.15 | |
| 3 | 5 | VX2F0 | 1.96 | 0.55 | 0.75 | 0.8 | |
| | 7 | | 3.99 | 0.44 | 1.08 | 0.3 | |

## Fluid and Ambient Temperature

| Fluid temperature (°C) | Ambient temperature (°C) |
|---|---|
| −10 Note) to 60 | −20 to 60 |

Note) Dew point temperature: −10°C or less

## Valve Leakage Rate

### Internal Leakage

| Seal material Note 2) | Leakage rate Note 1) |
|---|---|
| NBR (FKM) | 1 cm³/min or less |

### External Leakage

| Seal material Note 2) | Leakage rate Note 1) |
|---|---|
| NBR (FKM) | 1 cm³/min or less |

Note 1) Leakage is the value at ambient temperature 20°C.
Note 2) For seal material/FKM, refer to “Other Options” on page 21 for the selection.

## How to Order (Solenoid Valve for Manifold)

**VX2 A 0 A A**

**Fluid**

| | |
|---|---|
| 0 | Air |

**Common Specifications**

| | |
|---|---|
| Seal material | NBR |
| Coil insulation type | Class B |

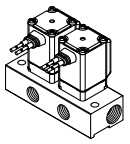
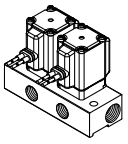
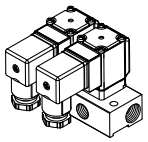
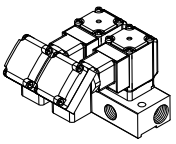
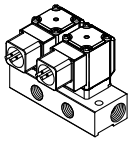
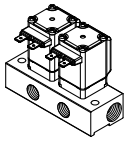
**Coil size/Valve type**

| Size | Symbol | Valve type |
|---|---|---|
| Size 1 | A | N.C. |
| | D | N.O. |
| Size 2 | B | N.C. |
| | E | N.O. |
| Size 3 | C | N.C. |
| | F | N.O. |

**Body material/Orifice diameter**

| Symbol | Body material | Orifice diameter |
|---|---|---|
| A | Resin | 2 |
| B | | 3 |
| C | | 5 |
| A | Resin | 4 |
| B | | 7 |
| A | Resin | 5 |
| B | | 7 |

**Voltage/Electrical entry**

| Symbol | Voltage | Electrical entry |
|---|---|---|
| A | 24 VDC | Grommet  |
| B | 100 VAC | Grommet (With surge voltage suppressor)  |
| C | 110 VAC | |
| D | 200 VAC | |
| E | 230 VAC | |
| F | 24 VDC | |
| G | 24 VDC | DIN terminal (With surge voltage suppressor)  |
| H | 100 VAC | |
| J | 110 VAC | |
| K | 200 VAC | |
| L | 230 VAC | |
| M | 24 VDC | Conduit terminal (With surge voltage suppressor)  |
| N | 100 VAC | |
| P | 110 VAC | |
| Q | 200 VAC | |
| R | 230 VAC | |
| S | 24 VDC | Conduit (With surge voltage suppressor)  |
| T | 100 VAC | |
| U | 110 VAC | |
| V | 200 VAC | |
| W | 230 VAC | |
| Y | 24 VDC | Flat terminal  |
| Z | Other voltages | |

**For special options, refer to pages 21 to 23.**

| | |
|---|---|
| Special voltage | 24 VAC |
| | 48 VAC |
| | 220 VAC |
| | 240 VAC |
| | 12 VDC |
| DIN terminal with light | |
| Conduit terminal with light | |
| Without DIN connector | |
| Seal material: EPDM | |
| Low concentration ozone resistant (Seal material: FKM) | |
| Oil-free | |
| Special electrical entry direction | |

**⚠Caution**

**Mounting orientation exists when mounting valves onto manifold base. Refer to page 48 for details.**

## Manifold Base/How to Order

**VVX2 1 0 A 02 ☐**

**Fluid**

| | |
|---|---|
| 0 | Air |

**Coil size**

| Size | Symbol |
|---|---|
| Size 1 | 1 |
| Size 2 | 2 |
| Size 3 | 3 |

**Base material/Port size/Base type**

| Symbol | Base material | Individual port size | Base type |
|---|---|---|---|
| A | Aluminum | 1/8 | Common |
| B | | 1/4 | SUP |

Common port size: 3/8 (IN port)

**Stations**

| Symbol | Stations |
|---|---|
| 02 | 2 stations |
| 03 | 3 stations |
| 04 | 4 stations |
| 05 | 5 stations |
| 06 | 6 stations |
| 07 | 7 stations |
| 08 | 8 stations |
| 09 | 9 stations |
| 10 | 10 stations |

| Symbol | Oil-free | Special thread |
|---|---|---|
| Nil | — | Rc |
| A | — | G |
| B | — | NPT |
| D | ○ | G |
| E | ○ | NPT |
| Z | ○ | Rc |

## Blanking Plate Assembly Part No.

**For size 1 VVX021S-4A-N**

**For size 2 VVX022S-4A-N**

**For size 3 VVX023S-4A-N**

When mounting a blanking plate assembly, if the solenoid valve for the manifold is ozone resistant, (Seal material: FKM), please select FKM.

**Seal material**

| | |
|---|---|
| N | NBR |
| F | FKM |

Dimensions → Page 35

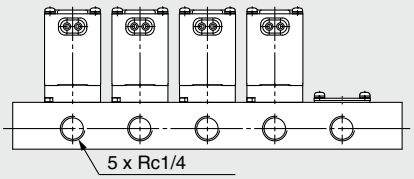
## How to Order Manifold Assembly (Example)

Enter the valve and blanking plate to be mounted under the manifold base part number.

**<Example>**

**VVX210B05……..1**
**∗VX2A0AA ……4**
**∗VVX021S-4A-N ……1**
**→ "∗" is the symbol for mounting.**
**Add an "∗" in front of the part numbers for solenoid valves etc. to be mounted.**

D side (Stations) 1 2 3 4 5 U side




Enter the product's part number in order, counting the 1st station from the D side (left in the manifold arrangement, when viewing the individual port in front).

# For Medium Vacuum (0.1 Pa·abs or more) Single Unit

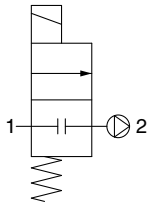
∗ This valve can also be used with air.
(Refer to the valve specifications for air.)

## Model/Valve Specifications

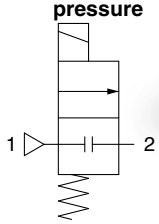
**Symbol (Application example)**

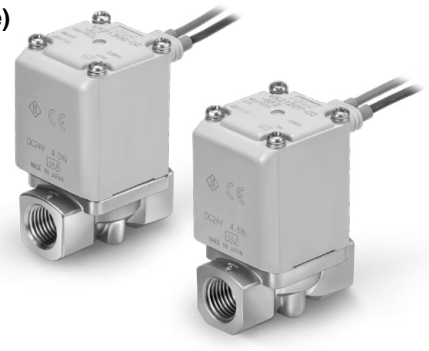
**N.C.**

① Used with vacuum




② Used with pressure



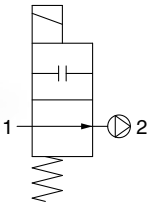



When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

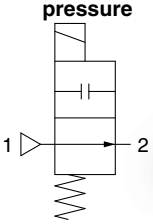
**Symbol (Application example)**

**N.O.**

① Used with vacuum




② Used with pressure






When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

### Normally Closed (N.C.)

| Size | Port size | Orifice diameter (mmø) | Model | Flow-rate characteristics | | | Operating pressure range | | Max. system pressure (MPa) | Weight Note) (g) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | C [dm³/(s·bar)] | b | Cv | ① Used with vacuum (Pa·abs) | ② Used with pressure (MPa·G) | | |
| 1 | 1/8, 1/4 | 2 | VX214 | 0.63 | 0.63 | 0.23 | 0.1 to atmospheric pressure | 0 to 1.0 | 1.0 | 300 |
| | | 3 | | 1.05 | 0.68 | 0.41 | | 0 to 0.6 | | 300 |
| | | 5 | | 2.20 | 0.39 | 0.62 | | 0 to 0.2 | | 300 |
| 2 | 1/4, 3/8 | 4 | VX224 | 1.90 | 0.52 | 0.62 | | 0 to 1.0 | | 460 |
| | | 7 | | 3.99 | 0.44 | 1.08 | | 0 to 0.15 | | 460 |
| 3 | 1/4, 3/8 | 5 | VX234 | 1.96 | 0.55 | 0.75 | | 0 to 1.0 | | 580 |
| | | 8 | | 5.67 | 0.33 | 1.58 | | 0 to 0.3 | | 580 |
| | | 10 | | 5.74 | 0.64 | 2.21 | | 0 to 0.1 | | 580 |
| | 1/2 | 10 | | 8.42 | 0.39 | 2.21 | | 0 to 0.1 | | 630 |

### Normally Open (N.O.)

| Size | Port size | Orifice diameter (mmø) | Model | Flow-rate characteristics | | | Operating pressure range | | Max. system pressure (MPa) | Weight Note) (g) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | C [dm³/(s·bar)] | b | Cv | ① Used with vacuum (Pa·abs) | ② Used with pressure (MPa·G) | | |
| 1 | 1/8, 1/4 | 2 | VX244 | 0.63 | 0.63 | 0.23 | 0.1 to atmospheric pressure | 0 to 0.9 | 1.0 | 320 |
| | | 3 | | 1.05 | 0.68 | 0.41 | | 0 to 0.45 | | 320 |
| | | 5 | | 2.20 | 0.39 | 0.62 | | 0 to 0.2 | | 320 |
| 2 | 1/4, 3/8 | 4 | VX254 | 1.90 | 0.52 | 0.62 | | 0 to 0.8 | | 490 |
| | | 7 | | 3.99 | 0.44 | 1.08 | | 0 to 0.15 | | 490 |
| 3 | 1/4, 3/8 | 5 | VX264 | 1.96 | 0.55 | 0.75 | | 0 to 0.8 | | 620 |
| | | 8 | | 5.67 | 0.33 | 1.58 | | 0 to 0.3 | | 620 |

Note) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.

## Fluid and Ambient Temperature

| Fluid temperature (°C) | Ambient temperature (°C) |
|---|---|
| 1 to 60 Note) | −20 to 60 |

Note) With no freezing

## Valve Leakage Rate

### Internal Leakage

| Seal material | Leakage rate Note) |
|---|---|
| FKM | $10^{-6}$ Pa·m³/sec or less |

### External Leakage

| Seal material | Leakage rate Note) |
|---|---|
| FKM | $10^{-6}$ Pa·m³/sec or less |

Note) Leakage ($10^{-6}$ Pa·m³/sec) is the value at differential pressure 0.1 MPa and ambient temperature 20°C.

## How to Order (Single Unit)

**VX2 [1] [4] [A] [A]**

**Fluid**

| | |
|---|---|
| 4 | Medium vacuum |

**Common Specifications**

| | |
|---|---|
| Seal material | FKM |
| Coil insulation type | Class B |
| Thread type | Rc |
| Oil-free | |
| Non-leak | |

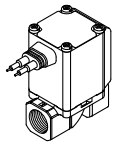
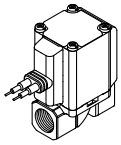
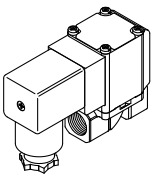
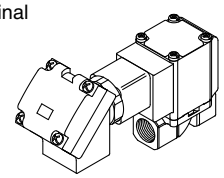
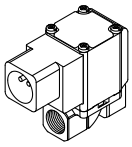
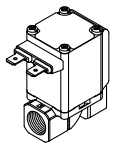
**Coil size/Valve type**

| Size | Symbol | Valve type |
|---|---|---|
| Size 1 | 1 | N.C. |
| | 4 | N.O. |
| Size 2 | 2 | N.C. |
| | 5 | N.O. |
| Size 3 | 3 | N.C. |
| | 6 | N.O. |

**Body material/Port size/Orifice diameter**

| Symbol | Body material | Port size | Orifice diameter |
|---|---|---|---|
| A | C37 | 1/8 | 2 |
| B | | | 3 |
| C | | | 5 |
| D | | 1/4 | 2 |
| E | | | 3 |
| F | | | 5 |
| H | Stainless steel | 1/8 | 2 |
| J | | | 3 |
| K | | | 5 |
| L | | 1/4 | 2 |
| M | | | 3 |
| N | | | 5 |
| A | C37 | 1/4 | 4 |
| B | | | 7 |
| D | | 3/8 | 4 |
| E | | | 7 |
| H | Stainless steel | 1/4 | 4 |
| J | | | 7 |
| L | | 3/8 | 4 |
| M | | | 7 |
| A | C37 | 1/4 | 5 |
| B | | | 8 |
| C | | | 10 (N.C. only) |
| D | | 3/8 | 5 |
| E | | | 8 |
| F | | | 10 (N.C. only) |
| G | | 1/2 | 10 (N.C. only) |
| H | Stainless steel | 1/4 | 5 |
| J | | | 8 |
| K | | | 10 (N.C. only) |
| L | | 3/8 | 5 |
| M | | | 8 |
| N | | | 10 (N.C. only) |
| P | | 1/2 | 10 (N.C. only) |

**Voltage/Electrical entry**

| Symbol | Voltage | Electrical entry |
|---|---|---|
| A | 24 VDC | Grommet  |
| B | 100 VAC | Grommet (With surge voltage suppressor)  |
| C | 110 VAC | |
| D | 200 VAC | |
| E | 230 VAC | |
| F | 24 VDC | |
| G | 24 VDC | DIN terminal (With surge voltage suppressor)  |
| H | 100 VAC | |
| J | 110 VAC | |
| K | 200 VAC | |
| L | 230 VAC | |
| M | 24 VDC | Conduit terminal (With surge voltage suppressor)  |
| N | 100 VAC | |
| P | 110 VAC | |
| Q | 200 VAC | |
| R | 230 VAC | |
| S | 24 VDC | Conduit (With surge voltage suppressor)  |
| T | 100 VAC | |
| U | 110 VAC | |
| V | 200 VAC | |
| W | 230 VAC | |
| Y | 24 VDC | Flat terminal  |
| Z | Other voltages | |

**For special options, refer to pages 21 to 23.**

| | |
|---|---|
| Special voltage | 24 VAC |
| | 48 VAC |
| | 220 VAC |
| | 240 VAC |
| | 12 VDC |
| DIN terminal with light | |
| Conduit terminal with light | |

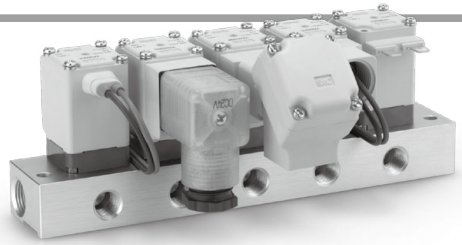
| |
|---|
| Without DIN connector |
| Seal material: EPDM |
| G thread |
| NPT thread |
| With bracket |
| Mounting holes on the bottom side of the body |
| Special electrical entry direction |

Dimensions→ Pages 32, 33 (Single unit)

# For Medium Vacuum (0.1 Pa·abs or more) Manifold

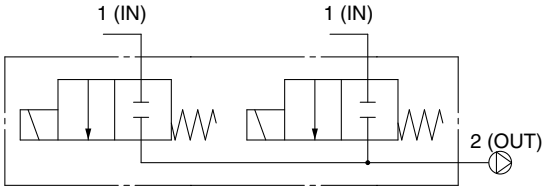
∗ For other fluids, please contact SMC.

## Model/Valve Specifications



**N.C.**

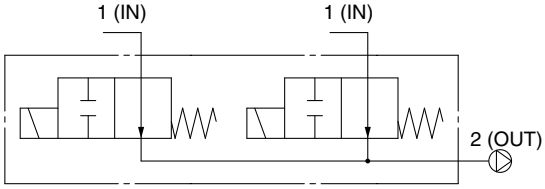
**Symbol**




**Individual SUP type**

**N.O.**

**Symbol**




**Individual SUP type**

When the valve is closed, flow is blocked from port 1 to port 2.
However, if the pressure in port 2 is higher than port 1,
the valve will not be able to block the fluid and it will flow from port 2 to port 1.

### Normally Closed (N.C.)

| Size | Orifice diameter (mmø) | Model | Flow-rate characteristics | | | Maximum operating pressure differential (MPa) | Max. system pressure (MPa) |
|---|---|---|---|---|---|---|---|
| | | | C [dm³/(s·bar)] | b | Cv | | |
| 1 | 2 | VX2A4 | 0.63 | 0.63 | 0.23 | 1.0 | 1.0 |
| | 3 | | 1.05 | 0.68 | 0.41 | 0.6 | |
| | 5 | | 2.20 | 0.39 | 0.62 | 0.2 | |
| 2 | 4 | VX2B4 | 1.90 | 0.52 | 0.62 | 1.0 | |
| | 7 | | 3.99 | 0.44 | 1.08 | 0.15 | |
| 3 | 5 | VX2C4 | 1.96 | 0.55 | 0.75 | 1.0 | |
| | 7 | | 3.99 | 0.44 | 1.08 | 0.3 | |

### Normally Open (N.O.)

| Size | Orifice diameter (mmø) | Model | Flow-rate characteristics | | | Maximum operating pressure differential (MPa) | Max. system pressure (MPa) |
|---|---|---|---|---|---|---|---|
| | | | C [dm³/(s·bar)] | b | Cv | | |
| 1 | 2 | VX2D4 | 0.63 | 0.63 | 0.23 | 0.9 | 1.0 |
| | 3 | | 1.05 | 0.68 | 0.41 | 0.45 | |
| | 5 | | 2.20 | 0.39 | 0.62 | 0.2 | |
| 2 | 4 | VX2E4 | 1.90 | 0.52 | 0.62 | 0.8 | |
| | 7 | | 3.99 | 0.44 | 1.08 | 0.15 | |
| 3 | 5 | VX2F4 | 1.96 | 0.55 | 0.75 | 0.8 | |
| | 7 | | 3.99 | 0.44 | 1.08 | 0.3 | |

## Fluid and Ambient Temperature

| Fluid temperature (°C) | Ambient temperature (°C) |
|---|---|
| 1 to 60 Note) | –20 to 60 |

Note) With no freezing

## Valve Leakage Rate

### Internal Leakage

| Seal material | Leakage rate Note) |
|---|---|
| FKM | $10^{-6}$ Pa·m³/sec or less |

### External Leakage

| Seal material | Leakage rate Note) |
|---|---|
| FKM | $10^{-6}$ Pa·m³/sec or less |

Note) Leakage ($10^{-6}$ Pa·m³/sec) is the value at differential pressure 0.1 MPa and ambient temperature 20°C.

## How to Order (Solenoid Valve for Manifold)

**VX2 A 4 A A**

**Fluid**

| | |
|---|---|
| 4 | Medium vacuum |

**Common Specifications**

| | |
|---|---|
| Seal material | FKM |
| Coil insulation type | Class B |
| Oil-free | |
| Non-leak | |

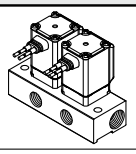
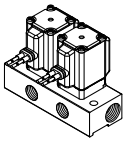
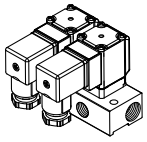
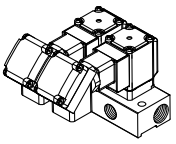
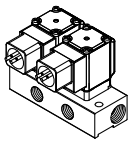
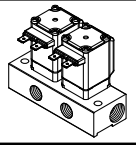
**Coil size/Valve type**

| Size | Symbol | Valve type |
|---|---|---|
| Size 1 | A | N.C. |
| | D | N.O. |
| Size 2 | B | N.C. |
| | E | N.O. |
| Size 3 | C | N.C. |
| | F | N.O. |

**Body material/Orifice diameter**

| Symbol | Body material | Orifice diameter |
|---|---|---|
| A | Resin | 2 |
| B | | 3 |
| C | | 5 |
| A | Resin | 4 |
| B | | 7 |
| A | Resin | 5 |
| B | | 7 |

**Voltage/Electrical entry**

| Symbol | Voltage | Electrical entry |
|---|---|---|
| A | 24 VDC | Grommet  |
| B | 100 VAC | Grommet (With surge voltage suppressor)  |
| C | 110 VAC | |
| D | 200 VAC | |
| E | 230 VAC | |
| F | 24 VDC | |
| G | 24 VDC | DIN terminal (With surge voltage suppressor)  |
| H | 100 VAC | |
| J | 110 VAC | |
| K | 200 VAC | |
| L | 230 VAC | |
| M | 24 VDC | Conduit terminal (With surge voltage suppressor)  |
| N | 100 VAC | |
| P | 110 VAC | |
| Q | 200 VAC | |
| R | 230 VAC | |
| S | 24 VDC | Conduit (With surge voltage suppressor)  |
| T | 100 VAC | |
| U | 110 VAC | |
| V | 200 VAC | |
| W | 230 VAC | |
| Y | 24 VDC | Flat terminal  |
| Z | Other voltages | |

**For special options, refer to pages 21 to 23.**

| | |
|---|---|
| Special voltage | 24 VAC |
| | 48 VAC |
| | 220 VAC |
| | 240 VAC |
| | 12 VDC |
| DIN terminal with light | |
| Conduit terminal with light | |
| Without DIN connector | |
| Seal material: EPDM | |
| Special electrical entry direction | |

**⚠Caution**
**Mounting orientation exists when mounting valves onto manifold base. Refer to page 48 for details.**

## Manifold Base/How to Order

**VVX2 1 4 A 02**

**Fluid**

| | |
|---|---|
| 4 | Medium vacuum |

**Coil size**

| Size | Symbol |
|---|---|
| Size 1 | 1 |
| Size 2 | 2 |
| Size 3 | 3 |

**Base material/Port size/Base type**

| Symbol | Base material | Individual port size | Base type |
|---|---|---|---|
| A | Aluminum | 1/8 | Individual SUP |
| B | | 1/4 | |

Common port size: 3/8 (OUT port)

**Stations**

| Symbol | Stations |
|---|---|
| 02 | 2 stations |
| 03 | 3 stations |
| 04 | 4 stations |
| 05 | 5 stations |
| 06 | 6 stations |
| 07 | 7 stations |
| 08 | 8 stations |
| 09 | 9 stations |
| 10 | 10 stations |

| Symbol | Special thread |
|---|---|
| Nil | Rc |
| A | G |
| B | NPT |

## Blanking Plate Assembly Part No.

**For size 1** **VVX021S-4A-F**
**For size 2** **VVX022S-4A-F**
**For size 3** **VVX023S-4A-F**

Dimensions → Page 35

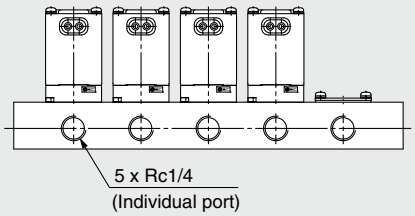
## How to Order Manifold Assembly (Example)

Enter the valve and blanking plate to be mounted under the manifold base part number.

**<Example>**

**VVX214B05.....1**
**∗VX2A4AA .....4**
**∗VVX021S-4A-F .....1**
**"∗" is the symbol for mounting.**
**Add an "∗" in front of the part numbers for solenoid valves etc. to be mounted.**

D side (Stations) 1 2 3 4 5 U side




Enter the product's part number in order, counting the 1st station from the D side (left in the manifold arrangement, when viewing the individual port in front).

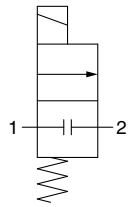
# For Water Single Unit

∗ This valve can also be used with air.
(Refer to the valve specifications for air.)

## Model/Valve Specifications

**Symbol**

**N.C.**

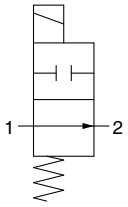





When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

**Symbol**

**N.O.**






When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

### Normally Closed (N.C.)

| Size | Port size | Orifice diameter (mmø) | Model | Flow-rate characteristics | | Maximum operating pressure differential (MPa) | Max. system pressure (MPa) | Weight Note) (g) |
|---|---|---|---|---|---|---|---|---|
| | | | | AV (x $10^{-6}$ $m^2$) | Conversion Cv | | | |
| 1 | 1/8, 1/4 | 2 | VX212 | 5.5 | 0.23 | 1 | 1.0 | 300 |
| | | 3 | | 10.0 | 0.42 | 0.6 | | 300 |
| | | 5 | | 15.0 | 0.63 | 0.2 | | 300 |
| 2 | 1/4, 3/8 | 4 | VX222 | 15.0 | 0.63 | 1 | | 460 |
| | | 7 | | 26.0 | 1.08 | 0.15 | | 460 |
| 3 | 1/4, 3/8 | 5 | VX232 | 18.0 | 0.75 | 1 | | 580 |
| | | 8 | | 38.0 | 1.58 | 0.3 | | 580 |
| | | 10 | | 53.0 | 2.21 | 0.1 | | 580 |
| | 1/2 | 10 | | 53.0 | 2.21 | 0.1 | | 630 |

### Normally Open (N.O.)

| Size | Port size | Orifice diameter (mmø) | Model | Flow-rate characteristics | | Maximum operating pressure differential (MPa) | Max. system pressure (MPa) | Weight Note) (g) |
|---|---|---|---|---|---|---|---|---|
| | | | | AV (x $10^{-6}$ $m^2$) | Conversion Cv | | | |
| 1 | 1/8, 1/4 | 2 | VX242 | 5.5 | 0.23 | 0.9 | 1.0 | 320 |
| | | 3 | | 10.0 | 0.42 | 0.45 | | 320 |
| | | 5 | | 15.0 | 0.63 | 0.2 | | 320 |
| 2 | 1/4, 3/8 | 4 | VX252 | 15.0 | 0.63 | 0.8 | | 490 |
| | | 7 | | 26.0 | 1.08 | 0.15 | | 490 |
| 3 | 1/4, 3/8 | 5 | VX262 | 18.0 | 0.75 | 0.8 | | 620 |
| | | 8 | | 38.0 | 1.58 | 0.3 | | 620 |

Note) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.
• Refer to “Glossary of Terms” on page 37 for details on the maximum operating pressure differential.

## Fluid and Ambient Temperature

| Fluid temperature (°C) | Ambient temperature (°C) |
|---|---|
| 1 to 60 Note) | –20 to 60 |

Note) With no freezing

## Valve Leakage Rate

### Internal Leakage

| Seal material Note 2) | Leakage rate (Water) Note 1) |
|---|---|
| NBR (FKM) | 0.1 $cm^3$/min or less |

### External Leakage

| Seal material Note 2) | Leakage rate (Water) Note 1) |
|---|---|
| NBR (FKM) | 0.1 $cm^3$/min or less |

Note 1) Leakage is the value at ambient temperature 20°C.
Note 2) For seal material/FKM, refer to “Other Options” on page 21 for the selection.

## How to Order (Single Unit)

Note) Refer to the table on page 25 for UL-compliant.

RoHS

**VX2 [1] [2] [A] [A]**

**Fluid**

| | |
|---|---|
| 2 | Water |

**Common Specifications**

| | |
|---|---|
| Seal material | NBR |
| Coil insulation type | Class B |
| Thread type | Rc |

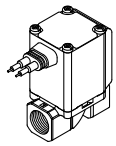
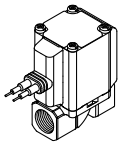
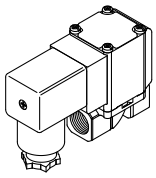
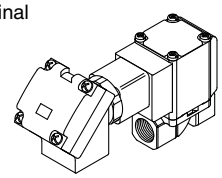
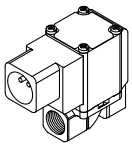
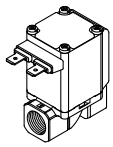
**Coil size/Valve type**

| Size | Symbol | Valve type |
|---|---|---|
| Size 1 | 1 | N.C. |
| | 4 | N.O. |
| Size 2 | 2 | N.C. |
| | 5 | N.O. |
| Size 3 | 3 | N.C. |
| | 6 | N.O. |

**Body material/Port size/Orifice diameter**

| Symbol | Body material | Port size | Orifice diameter |
|---|---|---|---|
| A | C37 | 1/8 | 2 |
| B | | | 3 |
| C | | | 5 |
| D | | 1/4 | 2 |
| E | | | 3 |
| F | | | 5 |
| H | Stainless steel | 1/8 | 2 |
| J | | | 3 |
| K | | | 5 |
| L | | 1/4 | 2 |
| M | | | 3 |
| N | | | 5 |
| A | C37 | 1/4 | 4 |
| B | | | 7 |
| D | | 3/8 | 4 |
| E | | | 7 |
| H | Stainless steel | 1/4 | 4 |
| J | | | 7 |
| L | | 3/8 | 4 |
| M | | | 7 |
| A | C37 | 1/4 | 5 |
| B | | | 8 |
| C | | | 10 (N.C. only) |
| D | | 3/8 | 5 |
| E | | | 8 |
| F | | | 10 (N.C. only) |
| G | | 1/2 | 10 (N.C. only) |
| H | Stainless steel | 1/4 | 5 |
| J | | | 8 |
| K | | | 10 (N.C. only) |
| L | | 3/8 | 5 |
| M | | | 8 |
| N | | | 10 (N.C. only) |
| P | | 1/2 | 10 (N.C. only) |

**Voltage/Electrical entry**

| Symbol | Voltage | Electrical entry |
|---|---|---|
| A | 24 VDC | Grommet  |
| B | 100 VAC | Grommet (With surge voltage suppressor)  |
| C | 110 VAC | |
| D | 200 VAC | |
| E | 230 VAC | |
| F | 24 VDC | |
| G | 24 VDC | DIN terminal (With surge voltage suppressor)  |
| H | 100 VAC | |
| J | 110 VAC | |
| K | 200 VAC | |
| L | 230 VAC | |
| M | 24 VDC | Conduit terminal (With surge voltage suppressor)  |
| N | 100 VAC | |
| P | 110 VAC | |
| Q | 200 VAC | |
| R | 230 VAC | |
| S | 24 VDC | Conduit (With surge voltage suppressor)  |
| T | 100 VAC | |
| U | 110 VAC | |
| V | 200 VAC | |
| W | 230 VAC | |
| Y | 24 VDC | Flat terminal  |
| Z | Other voltages | |

**For special options, refer to pages 21 to 23.**

| | |
|---|---|
| Special voltage | 24 VAC |
| | 48 VAC |
| | 220 VAC |
| | 240 VAC |
| | 12 VDC |
| DIN terminal with light | |
| Conduit terminal with light | |
| Without DIN connector | |

| |
|---|
| Applicable to deionized water (Seal material: FKM) |
| Seal material: EPDM |
| Oil-free |
| G thread |
| NPT thread |
| With bracket |
| Mounting holes on the bottom side of the body |
| Special electrical entry direction |

Dimensions → Pages 32, 33 (Single unit)

# For Oil Single Unit

∗ This valve can also be used with air or water.
(Refer to the valve specifications for air or water.)

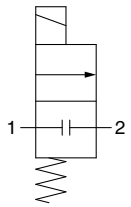
**⚠When the fluid is oil.**

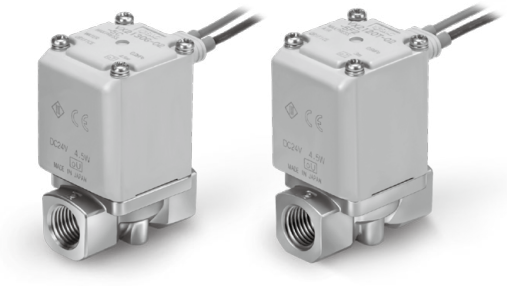
**The kinematic viscosity must not exceed 50 mm²/s.**
**The special construction of the armature adopted in the built-in full-wave rectifier type gives an improvement in OFF response by providing clearance on the absorbed surface when it is switched ON.**

## Model/Valve Specifications

**Symbol**

**N.C.**

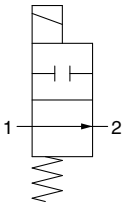


When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

**Symbol**

**N.O.**






When the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

### Normally Closed (N.C.)

| Size | Port size | Orifice diameter (mmø) | Model | Flow-rate characteristics | | Maximum operating pressure differential (MPa) | Max. system pressure (MPa) | Weight Note) (g) |
|---|---|---|---|---|---|---|---|---|
| | | | | AV (x $10^{-6}m^2$) | Conversion Cv | | | |
| 1 | 1/8, 1/4 | 2 | VX213 | 5.5 | 0.23 | 1 | 1.0 | 300 |
| | | 3 | | 10.0 | 0.42 | 0.6 | | 300 |
| | | 5 | | 15.0 | 0.63 | 0.2 | | 300 |
| 2 | 1/4, 3/8 | 4 | VX223 | 15.0 | 0.63 | 1 | | 460 |
| | | 7 | | 26.0 | 1.08 | 0.15 | | 460 |
| 3 | 1/4, 3/8 | 5 | VX233 | 18.0 | 0.75 | 1 | | 580 |
| | | 8 | | 38.0 | 1.58 | 0.3 | | 580 |
| | | 10 | | 53.0 | 2.21 | 0.1 | | 580 |
| | 1/2 | 10 | | 53.0 | 2.21 | 0.1 | | 630 |

### Normally Open (N.O.)

| Size | Port size | Orifice diameter (mmø) | Model | Flow-rate characteristics | | Maximum operating pressure differential (MPa) | Max. system pressure (MPa) | Weight Note) (g) |
|---|---|---|---|---|---|---|---|---|
| | | | | AV (x $10^{-6}m^2$) | Conversion Cv | | | |
| 1 | 1/8, 1/4 | 2 | VX243 | 5.5 | 0.23 | 0.9 | 1.0 | 320 |
| | | 3 | | 10.0 | 0.42 | 0.45 | | 320 |
| | | 5 | | 15.0 | 0.63 | 0.2 | | 320 |
| 2 | 1/4, 3/8 | 4 | VX253 | 15.0 | 0.63 | 0.8 | | 490 |
| | | 7 | | 26.0 | 1.08 | 0.15 | | 490 |
| 3 | 1/4, 3/8 | 5 | VX263 | 18.0 | 0.75 | 0.8 | | 620 |
| | | 8 | | 38.0 | 1.58 | 0.3 | | 620 |

Note) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.
• Refer to "Glossary of Terms" on page 37 for details on the maximum operating pressure differential.

## Fluid and Ambient Temperature

| Fluid temperature (°C) | Ambient temperature (°C) |
|---|---|
| –5 Note) to 60 | –20 to 60 |

Note) Kinematic viscosity: 50 mm²/s or less

## Valve Leakage Rate

### Internal Leakage

| Seal material | Leakage rate (Oil) Note) |
|---|---|
| FKM | 0.1 cm³/min or less |

### External Leakage

| Seal material | Leakage rate (Oil) Note) |
|---|---|
| FKM | 0.1 cm³/min or less |

Note) Leakage is the value at ambient temperature 20°C.

## How to Order

**VX2 [1] [3] [A] [A]**

**Fluid**

| | |
|---|---|
| 3 | Oil |

**Common Specifications**

| | |
|---|---|
| Seal material | FKM |
| Coil insulation type | Class B |
| Thread type | Rc |

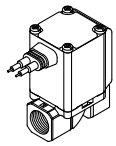
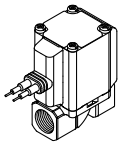
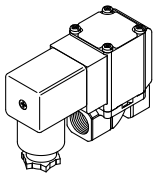
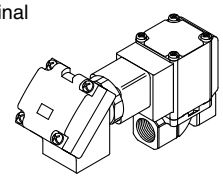
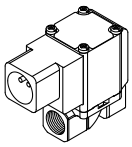
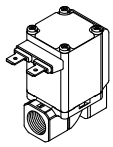
### Coil size/Valve type

| Size | Symbol | Valve type |
|---|---|---|
| Size 1 | 1 | N.C. |
| | 4 | N.O. |
| Size 2 | 2 | N.C. |
| | 5 | N.O. |
| Size 3 | 3 | N.C. |
| | 6 | N.O. |

### Body material/Port size/Orifice diameter

| Symbol | Body material | Port size | Orifice diameter |
|---|---|---|---|
| A | C37 | 1/8 | 2 |
| B | | | 3 |
| C | | | 5 |
| D | | 1/4 | 2 |
| E | | | 3 |
| F | | | 5 |
| H | Stainless steel | 1/8 | 2 |
| J | | | 3 |
| K | | | 5 |
| L | | 1/4 | 2 |
| M | | | 3 |
| N | | | 5 |
| A | C37 | 1/4 | 4 |
| B | | | 7 |
| D | | 3/8 | 4 |
| E | | | 7 |
| H | Stainless steel | 1/4 | 4 |
| J | | | 7 |
| L | | 3/8 | 4 |
| M | | | 7 |
| A | C37 | 1/4 | 5 |
| B | | | 8 |
| C | | | 10 (N.C. only) |
| D | | 3/8 | 5 |
| E | | | 8 |
| F | | | 10 (N.C. only) |
| G | | 1/2 | 10 (N.C. only) |
| H | Stainless steel | 1/4 | 5 |
| J | | | 8 |
| K | | | 10 (N.C. only) |
| L | | 3/8 | 5 |
| M | | | 8 |
| N | | | 10 (N.C. only) |
| P | | 1/2 | 10 (N.C. only) |

### Voltage/Electrical entry

| Symbol | Voltage | Electrical entry |
|---|---|---|
| A | 24 VDC | Grommet  |
| B | 100 VAC | Grommet (With surge voltage suppressor)  |
| C | 110 VAC | |
| D | 200 VAC | |
| E | 230 VAC | |
| F | 24 VDC | |
| G | 24 VDC | DIN terminal (With surge voltage suppressor)  |
| H | 100 VAC | |
| J | 110 VAC | |
| K | 200 VAC | |
| L | 230 VAC | |
| M | 24 VDC | Conduit terminal (With surge voltage suppressor)  |
| N | 100 VAC | |
| P | 110 VAC | |
| Q | 200 VAC | |
| R | 230 VAC | |
| S | 24 VDC | Conduit (With surge voltage suppressor)  |
| T | 100 VAC | |
| U | 110 VAC | |
| V | 200 VAC | |
| W | 230 VAC | |
| Y | 24 VDC | Flat terminal  |
| Z | Other voltages | |

**For special options, refer to pages 21 to 23.**

| | |
|---|---|
| Special voltage | 24 VAC |
| | 48 VAC |
| | 220 VAC |
| | 240 VAC |
| | 12 VDC |
| DIN terminal with light | |
| Conduit terminal with light | |

| |
|---|
| Without DIN connector |
| Oil-free |
| G thread |
| NPT thread |
| With bracket |
| Mounting holes on the bottom side of the body |
| Special electrical entry direction |

Dimensions → Pages 32, 33 (Single unit)

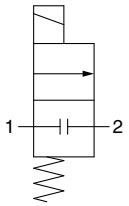
# For Steam Single Unit

∗ This valve can also be used with air, water, oil or heated water.
(Refer to the valve specifications for air, water or oil.)

## Model/Valve Specifications

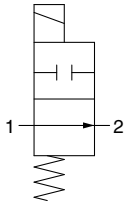
**Symbol**

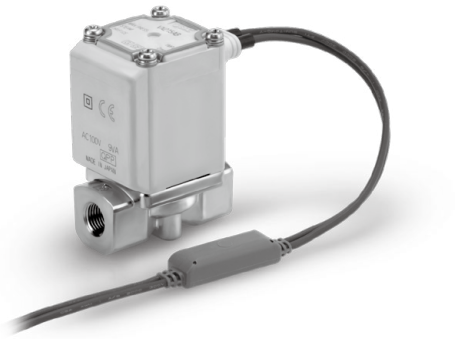
**N.C.**




**Symbol**

**N.O.**



When the valve is closed, flow is blocked from port 1 to port 2.
However, if the pressure in port 2 is higher than port 1,
the valve will not be able to block the fluid and it will flow from port 2 to port 1.

### Normally Closed (N.C.)

| Size | Port size | Orifice diameter (mmø) | Model | Flow-rate characteristics | | Maximum operating pressure differential (MPa) | Max. system pressure (MPa) | Weight Note) (g) |
|---|---|---|---|---|---|---|---|---|
| | | | | AV (x $10^{-6}$ $m^2$) | Conversion Cv | | | |
| **1** | 1/8, 1/4 | 2 | **VX215** | 5.5 | 0.23 | 1 | 1.0 | 300 |
| | | 3 | | 10.0 | 0.42 | 0.6 | | 300 |
| | | 5 | | 15.0 | 0.63 | 0.2 | | 300 |
| **2** | 1/4, 3/8 | 4 | **VX225** | 15.0 | 0.63 | 1 | | 460 |
| | | 7 | | 26.0 | 1.08 | 0.15 | | 460 |
| **3** | 1/4, 3/8 | 5 | **VX235** | 18.0 | 0.75 | 1 | | 580 |
| | | 8 | | 38.0 | 1.58 | 0.3 | | 580 |
| | | 10 | | 53.0 | 2.21 | 0.1 | | 580 |
| | 1/2 | 10 | | 53.0 | 2.21 | 0.1 | | 630 |

### Normally Open (N.O.)

| Size | Port size | Orifice diameter (mmø) | Model | Flow-rate characteristics | | Maximum operating pressure differential (MPa) | Max. system pressure (MPa) | Weight Note) (g) |
|---|---|---|---|---|---|---|---|---|
| | | | | AV (x $10^{-6}$ $m^2$) | Conversion Cv | | | |
| **1** | 1/8, 1/4 | 2 | **VX245** | 5.5 | 0.23 | 0.9 | 1.0 | 320 |
| | | 3 | | 10.0 | 0.42 | 0.45 | | 320 |
| | | 5 | | 15.0 | 0.63 | 0.2 | | 320 |
| **2** | 1/4, 3/8 | 4 | **VX255** | 15.0 | 0.63 | 0.8 | | 490 |
| | | 7 | | 26.0 | 1.08 | 0.15 | | 490 |
| **3** | 1/4, 3/8 | 5 | **VX265** | 18.0 | 0.75 | 0.8 | | 620 |
| | | 8 | | 38.0 | 1.58 | 0.3 | | 620 |

Note) Weight of grommet type. Add 10 g for conduit type, 60 g for conduit terminal type respectively.

## Fluid and Ambient Temperature

| Fluid temperature (°C) | Ambient temperature (°C) |
|---|---|
| Steam: 183 or less | −20 to 60 |
| Heated water: 99 or less | |

## Valve Leakage Rate

### Internal Leakage

| Fluid | Seal material | Leakage rate |
|---|---|---|
| Steam | FKM for high temperature | 1.0 $cm^3$/min or less |
| Heated water | | 0.1 $cm^3$/min or less |

### External Leakage

| Fluid | Seal material | Leakage rate |
|---|---|---|
| Steam | FKM for high temperature | 1.0 $cm^3$/min or less |
| Heated water | | 0.1 $cm^3$/min or less |

## How to Order (Single Unit)

**VX2 [1] [5] [A] [B]**

**Fluid**

| | |
|---|---|
| 5 | Steam |

∗ Can be used with heated water.

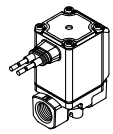
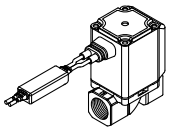
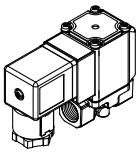
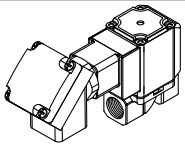
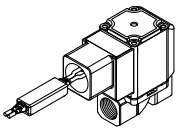
**Coil size/Valve type**

| Size | Symbol | Valve type |
|---|---|---|
| Size 1 | 1 | N.C. |
| | 4 | N.O. |
| Size 2 | 2 | N.C. |
| | 5 | N.O. |
| Size 3 | 3 | N.C. |
| | 6 | N.O. |

**Body material/Port size/Orifice diameter**

| Symbol | Body material | Port size | Orifice diameter |
|---|---|---|---|
| A | C37 | 1/8 | 2 |
| B | | | 3 |
| C | | | 5 |
| D | | 1/4 | 2 |
| E | | | 3 |
| F | | | 5 |
| H | Stainless steel | 1/8 | 2 |
| J | | | 3 |
| K | | | 5 |
| L | | 1/4 | 2 |
| M | | | 3 |
| N | | | 5 |
| A | C37 | 1/4 | 4 |
| B | | | 7 |
| D | | 3/8 | 4 |
| E | | | 7 |
| H | Stainless steel | 1/4 | 4 |
| J | | | 7 |
| L | | 3/8 | 4 |
| M | | | 7 |
| A | C37 | 1/4 | 5 |
| B | | | 8 |
| C | | | 10 (Only N.C.) |
| D | | 3/8 | 5 |
| E | | | 8 |
| F | | | 10 (Only N.C.) |
| G | | 1/2 | 10 (Only N.C.) |
| H | Stainless steel | 1/4 | 5 |
| J | | | 8 |
| K | | | 10 (Only N.C.) |
| L | | 3/8 | 5 |
| M | | | 8 |
| N | | | 10 (Only N.C.) |
| P | | 1/2 | 10 (Only N.C.) |

**Voltage/Electrical entry**

| Symbol | Voltage | Electrical entry Note 3) |
|---|---|---|
| A | 24 VDC | Grommet  |
| B | 100 VAC | Grommet (With surge voltage suppressor)  |
| C | 110 VAC | |
| D | 200 VAC | |
| E | 230 VAC | |
| G | 24 VDC | DIN terminal (With surge voltage suppressor Note 1) 2))  |
| H | 100 VAC | |
| J | 110 VAC | |
| K | 200 VAC | |
| L | 230 VAC | |
| N | 100 VAC | Conduit terminal (With surge voltage suppressor)  |
| P | 110 VAC | |
| Q | 200 VAC | |
| R | 230 VAC | |
| T | 100 VAC | Conduit (With surge voltage suppressor)  |
| U | 110 VAC | |
| V | 200 VAC | |
| W | 230 VAC | |
| Z | Other voltages | |

Note 1) AC voltage coil for "H" of DIN terminal type does not have full-wave rectifier. Full-wave rectifier is built on the DIN connector side. Refer to page 36 to order it as an accessory.
Note 2) DIN connector insulation class is Class "B".
Note 3) Flat terminal is not available.

**Common Specifications**

| | |
|---|---|
| Seal material | FKM for high temperature |
| Coil insulation type | Class H |
| Thread type | Rc |

**For special options, refer to pages 21 to 23.**

| | |
|---|---|
| Special voltage | 24 VAC |
| | 48 VAC |
| | 220 VAC |
| | 240 VAC |
| DIN terminal with light | |
| Conduit terminal with light | |
| Seal material: EPDM | |
| Oil-free | |
| G thread | |
| NPT thread | |
| With bracket | |
| Mounting holes on the bottom side of the body | |
| Special electrical entry direction | |

Dimensions → Page 34 (Single unit)

# Special Options

## Electrical Options
**(Special voltage, With light, Without DIN connector)**

**VX2 1 0 A Z 1A**

**Enter standard product number.**

**Electrical option**

**Electrical specification/Voltage/Electrical entry**

| Specification | Symbol | Class H* | Voltage | Electrical entry |
|---|---|---|---|---|
| Special voltage | **1A** | ● | 48 VAC | Grommet (With surge voltage suppressor) |
| | **1B** | ● | 220 VAC | |
| | **1C** | ● | 240 VAC | |
| | **1U** | ● | 24 VAC | |
| | **1D** | — | 12 VDC | Grommet |
| | **1E** | — | 12 VDC | Grommet (With surge voltage suppressor) |
| | **1F** | ● | 48 VAC | DIN terminal (With surge voltage suppressor) |
| | **1G** | ● | 220 VAC | |
| | **1H** | ● | 240 VAC | |
| | **1V** | ● | 24 VAC | |
| | **1J** | — | 12 VDC | |
| | **1K** | ● | 48 VAC | Conduit terminal (With surge voltage suppressor) |
| | **1L** | ● | 220 VAC | |
| | **1M** | ● | 240 VAC | |
| | **1W** | ● | 24 VAC | |
| | **1N** | — | 12 VDC | |
| | **1P** | ● | 48 VAC | Conduit (With surge voltage suppressor) |
| | **1Q** | ● | 220 VAC | |
| | **1R** | ● | 240 VAC | |
| | **1Y** | ● | 24 VAC | |
| | **1S** | — | 12 VDC | |
| | **1T** | — | 12 VDC | Flat terminal |
| With light | **2A** | ● | 24 VDC | DIN terminal (With surge voltage suppressor) |
| | **2B** | ● | 100 VAC | |
| | **2C** | ● | 110 VAC | |
| | **2D** | ● | 200 VAC | |
| | **2E** | ● | 230 VAC | |
| | **2F** | ● | 48 VAC | |
| | **2G** | ● | 220 VAC | |
| | **2H** | ● | 240 VAC | |
| | **2V** | ● | 24 VAC | |
| | **2J** | — | 12 VDC | |
| | **2K** | — | 24 VDC | Conduit terminal (With surge voltage suppressor) |
| | **2L** | ● | 100 VAC | |
| | **2M** | ● | 110 VAC | |
| | **2N** | ● | 200 VAC | |
| | **2P** | ● | 230 VAC | |
| | **2Q** | ● | 48 VAC | |
| | **2R** | ● | 220 VAC | |
| | **2S** | ● | 240 VAC | |
| | **2W** | ● | 24 VAC | |
| | **2T** | — | 12 VDC | |
| Without DIN connector | **3A** | — | 24 VDC | DIN terminal (With surge voltage suppressor) |
| | **3B** | — | 100 VAC | |
| | **3C** | — | 110 VAC | |
| | **3D** | — | 200 VAC | |
| | **3E** | — | 230 VAC | |
| | **3F** | — | 48 VAC | |
| | **3G** | — | 220 VAC | |
| | **3H** | — | 240 VAC | |
| | **3V** | — | 24 VAC | |
| | **3J** | — | 12 VDC | |

∗ Options marked with ● are available for Class “H” coil.
Applicable for all when the coil insulation class is Class “B”.

## Other Options

**Low concentration ozone resistant and applicable to deionized water**
**Oil-free**
**Port thread**

**VX2 1 0 A A Z**

**Enter standard product number.**

**Other option**

**Low concentration ozone resistant and applicable to deionized water/ Oil-free/Port thread**

| Symbol | Low concentration ozone resistant and applicable to deionized water*1 (Seal material: FKM) | Oil-free | Port thread |
|---|---|---|---|
| **Nil** | — | — | Rc, One-touch fitting*2 |
| **A** | — | — | G |
| **B** | | | NPT |
| **C** | ○ | — | Rc, One-touch fitting*2 |
| **D** | — | ○ | G |
| **E** | | | NPT |
| **F** | ○ | — | G |
| **G** | | | NPT |
| **H** | ○ | ○ | Rc, One-touch fitting*2 |
| **K** | | | G |
| **L** | | | NPT |
| **Z** | — | ○ | Rc, One-touch fitting*2 |

∗1 Applicable to air (VX2□0) and water (VX2□2).
∗2 When the body is resin, One-touch fittings are equipped.

∗ Enter symbols in the order below when ordering a combination of electrical option, other option, etc.

Example) **VX2 1 2 A Z 1A Z**

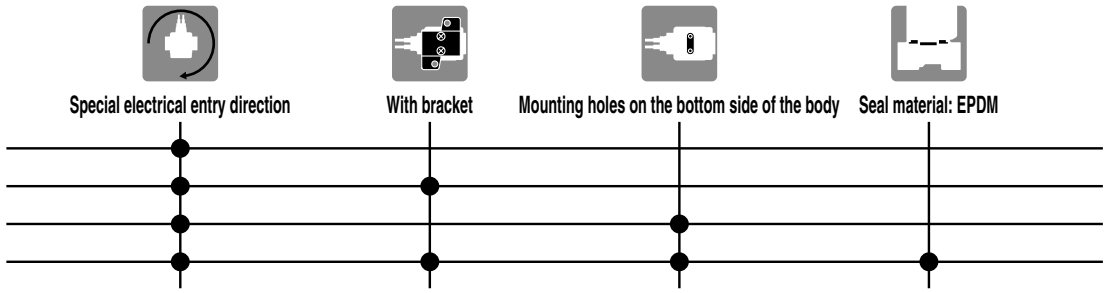
**Electrical option**

**Other option**

## Installation Options
### (Mounting Option/Special Electrical Entry Direction)

**The following shows combinations that can be selected using installation options.**

**Combinations**

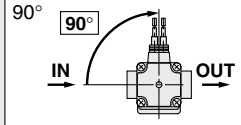
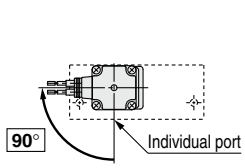
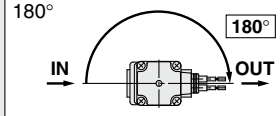
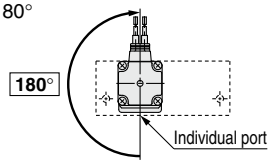
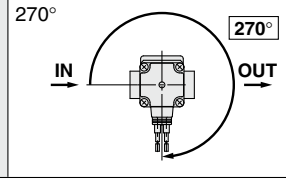
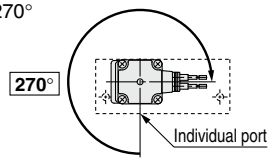



## Special Electrical Entry Direction

**VX2□□□□XC[A]**

**Enter standard product number.**

**Special electrical entry direction**

| Symbol | Electrical entry direction | |
|---|---|---|
| | Single unit | Manifold |
| **A** |   |   |
| **B** |   |   |
| **C** |   |   |

∗ Enter symbols in the order below when ordering a combination of electrical option, other option and special electrical entry direction.

Example) **VX2 1 2 A Z 1A Z XC A**

- **1A**: Electrical option
- **Z**: Other option
- **A**: Special electrical entry direction

∗ Enter symbols in the order below when ordering a combination of electrical option, other option and with bracket.

Example) **VX2 1 2 A Z 1A Z XB A**

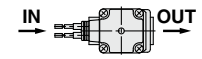
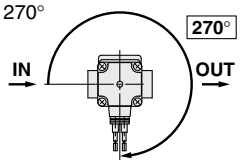
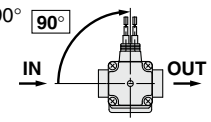
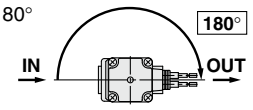
- **1A**: Electrical option
- **Z**: Other option
- **A**: With bracket/Special electrical entry direction

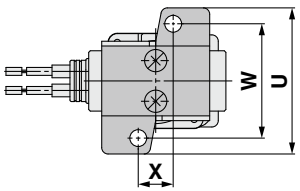
## With Bracket/ Special Electrical Entry Direction

**VX2□□□□XB[A]**

**Enter standard product number.**

**With bracket/Special electrical entry direction**

| Symbol | Electrical entry direction | Symbol | Electrical entry direction |
|---|---|---|---|
| **Nil** | Standard   | **C** |   |
| **A** |   | | |
| **B** |   | | |




(mm)

| Size | Port size | U | W | X |
|---|---|---|---|---|
| **1** | 1/8, 1/4 | 46 | 36 | 11 |
| **2** | 1/4, 3/8 | 56 | 46 | 13 |
| **3** | 1/4, 3/8 | 56 | 46 | 13 |
| | 1/2 | — | — | — |

∗1 Bracket is attached as standard with the resin body, so there are no XB settings.
∗2 When the orifice is ø8, ø10, and the body port size is 1/4 or 3/8, use a foot type bracket. (The L-bracket of the old VX series is not compatible.) If the body port size is 1/2, there are no XB settings. (Refer to the following.)
∗3 On the bottom side of the standard body, there is no female thread for mounting a bracket. Please be careful because the bracket cannot be retrofit.
∗4 Bracket is packed in the same container as the main body.

### Bracket Interchangeable with an Old Type

| Size | Port size | Orifice diameter (mmø) | Bracket interchangeable with an old type |
|---|---|---|---|
| **1** | 1/8, 1/4 | 2 | ● (Interchangeable) |
| | | 3 | ● (Interchangeable) |
| | | 5 | ● (Interchangeable) |
| **2** | 1/4, 3/8 | 4 | ● (Interchangeable) |
| | | 7 | ● (Interchangeable) |
| **3** | 1/4, 3/8 | 5 | ● (Interchangeable) |
| | | 8 | × (Not interchangeable)∗2 |
| | | 10 | × (Not interchangeable)∗2 |
| | 1/2 | 10 | — (Not available)∗2 |

## Installation Options
### (Mounting Option/Special Electrical Entry Direction)

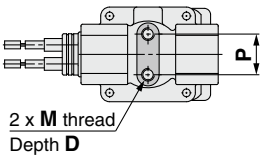
### Mounting Holes on the Bottom Side of the Body/ Special Electrical Entry Direction

**VX2□□□□XNB A**

**Enter standard product number.**

**Mounting holes on the bottom side of the body/ Special electrical entry direction**

| Symbol | Electrical entry direction | Symbol | Electrical entry direction |
|---|---|---|---|
| **Nil** | Standard | **C** | 270° |
| **A** | 90° | | |
| **B** | 180° | | |




(mm)

| Size | Port size | M | D | P |
|---|---|---|---|---|
| **1** | 1/8, 1/4 | M4 | 6 | 12.8 |
| **2** | 1/4, 3/8 | M5 | 8 | 19 |
| **3** | 1/4, 3/8 | M5 | 8 | 19 |
| | 1/2 | M5 | 8 | 23 |

Note) Resin body is not available.

∗ Enter symbols in the order below when ordering a combination of electrical option, other option and mounting holes on the bottom side of the body.

Example) **VX2 1 2 A Z 1A Z XNB A**

- **Electrical option**
- **Other option**
- **Mounting holes on the bottom side of the body/ Special electrical entry direction**

### Seal Material: EPDM/With Bracket/ Mounting Holes on the Bottom Side of the Body/ Special Electrical Entry Direction

**VX2□□□□X332A**

**Enter standard product number.**

**Seal material: EPDM**

**When the fluid is oil, enter the part number for water (VX2□2).**

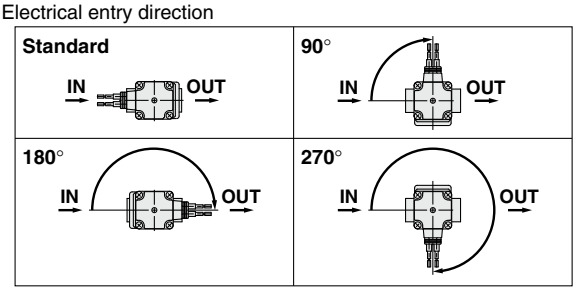
∗ **VX2□3□□ → VX2□2□□**

Refer to page 15 for model selection.

**With bracket/Mounting holes on the bottom side of the body/ Special electrical entry direction**

| Symbol | Specifications | |
|---|---|---|
| | Electrical entry direction | Bracket |
| **Nil** | IN side (Standard) | None |
| **A** | 90° | |
| **B** | 180° | |
| **C** | 270° | |
| **D** | IN side (Standard) | With bracket∗1 |
| **E** | 90° | |
| **F** | 180° | |
| **G** | 270° | |
| **H** | IN side (Standard) | Mounting holes on the bottom side of the body∗1 |
| **J** | 90° | |
| **K** | 180° | |
| **L** | 270° | |

∗1 Resin body is not available.
∗2 "Other Options", which can be combined, are A, B, D, E, Z.
∗3 Electrical entry direction




∗ Enter symbols in the order below when ordering a combination of electrical option, other option, seal material: EPDM, with bracket, mounting holes on the bottom side of the body and special electrical entry direction.

Example) **VX2 1 2 A Z 1A Z X332 A**

- **Electrical option**
- **Other option**
- **Seal material: EPDM/ With bracket/Mounting holes on the bottom side of the body/ Special electrical entry direction**

# Series VX21/22/23
# UL-compliant

∗ Refer to the table shown below for UL-compliant.

**For Air**

### VX210 Valve type: N.C.

| Size, Valve type, Fluid | Body material, Port size | Voltage, Electrical entry, Electrical options | Other options | With Note) bracket |
|---|---|---|---|---|
| VX210 | A | A | Nil | Nil |
| | B | B | A | XB |
| | C | C | B | |
| | D | D | C | |
| | E | E | D | |
| | F | F | E | |
| | H Note) | M | F | |
| | J Note) | N | G | |
| | K Note) | P | H | |
| | L Note) | Q | K | |
| | M Note) | R | L | |
| | N Note) | S | Z | |
| | | T | | |
| | | U | | |
| | | V | | |
| | | W | | |
| | | Y | | |
| | | Z1A | | |
| | | Z1B | | |
| | | Z1C | | |
| | | Z1U | | |
| | | Z1D | | |
| | | Z1E | | |
| | | Z1K | | |
| | | Z1L | | |
| | | Z1M | | |
| | | Z1W | | |
| | | Z1N | | |
| | | Z1P | | |
| | | Z1Q | | |
| | | Z1R | | |
| | | Z1Y | | |
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| | | Z1T | | |
| | | Z2K | | |
| | | Z2L | | |
| | | Z2M | | |
| | | Z2N | | |
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| | | Z2Q | | |
| | | Z2R | | |
| | | Z2S | | |
| | | Z2W | | |
| | | Z2T | | |
| | | Z3A | | |
| | | Z3B | | |
| | | Z3C | | |
| | | Z3D | | |
| | | Z3E | | |
| | | Z3F | | |
| | | Z3G | | |
| | | Z3H | | |
| | | Z3V | | |
| | | Z3J | | |

Note) Body material/ Port size: Since the bracket is attached to H, J, K, L, M and N, "XB" cannot be selected.

### VX220 Valve type: N.C.

| Size, Valve type, Fluid | Body material, Port size | Voltage, Electrical entry, Electrical options | Other options | With Note) bracket |
|---|---|---|---|---|
| VX220 | A | A | Nil | Nil |
| | B | B | A | XB |
| | D | C | B | |
| | E | D | C | |
| | H Note) | E | D | |
| | J Note) | F | E | |
| | L Note) | M | F | |
| | M Note) | N | G | |
| | | P | H | |
| | | Q | K | |
| | | R | L | |
| | | S | Z | |
| | | T | | |
| | | U | | |
| | | V | | |
| | | W | | |
| | | Y | | |
| | | Z1A | | |
| | | Z1B | | |
| | | Z1C | | |
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| | | Z1D | | |
| | | Z1E | | |
| | | Z1K | | |
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| | | Z3B | | |
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| | | Z3D | | |
| | | Z3E | | |
| | | Z3F | | |
| | | Z3G | | |
| | | Z3H | | |
| | | Z3V | | |
| | | Z3J | | |

Note) Body material/ Port size: Since the bracket is attached to H, J, L and M, "XB" cannot be selected.

### VX230 Valve type: N.C.

| Size, Valve type, Fluid | Body material, Port size | Voltage, Electrical entry, Electrical options | Other options | With Note) bracket |
|---|---|---|---|---|
| VX230 | A | A | Nil | Nil |
| | B | B | A | XB |
| | C | C | B | |
| | D | D | C | |
| | E | E | D | |
| | F | F | E | |
| | G Note 1) | M | F | |
| | H Note 2) | N | G | |
| | J Note 2) | P | H | |
| | K Note 2) | Q | K | |
| | L Note 2) | R | L | |
| | M Note 2) | S | Z | |
| | N Note 2) | T | | |
| | | U | | |
| | | V | | |
| | | W | | |
| | | Y | | |
| | | Z1A | | |
| | | Z1B | | |
| | | Z1C | | |
| | | Z1U | | |
| | | Z1D | | |
| | | Z1E | | |
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| | | Z1R | | |
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| | | Z1T | | |
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| | | Z2R | | |
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| | | Z2T | | |
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| | | Z3D | | |
| | | Z3E | | |
| | | Z3F | | |
| | | Z3G | | |
| | | Z3H | | |
| | | Z3V | | |
| | | Z3J | | |

Note 1) Body material/Port size: Since "with bracket" setting is not provided on G, "XB" cannot be selected.
Note 2) Body material/Port size: Since the bracket is attached to H, J, K, L, M and N, "XB" cannot be selected.

**Refer to pages 21 to 23 for electrical options, other options, and bracket/electrical entry direction.**

**For Water**

### VX212 Valve type: N.C.

| Size, Valve type, Fluid | Body material, Port size | Voltage, Electrical entry, Electrical options | Other options | With bracket |
|---|---|---|---|---|
| VX212 | A | A | Nil | Nil |
| | B | B | A | XB |
| | C | C | B | |
| | D | D | C | |
| | E | E | D | |
| | F | F | E | |
| | H | M | F | |
| | J | N | G | |
| | K | P | H | |
| | L | Q | K | |
| | M | R | L | |
| | N | S | Z | |
| | | T | | |
| | | U | | |
| | | V | | |
| | | W | | |
| | | Y | | |
| | | Z1A | | |
| | | Z1B | | |
| | | Z1C | | |
| | | Z1U | | |
| | | Z1D | | |
| | | Z1E | | |
| | | Z1K | | |
| | | Z1L | | |
| | | Z1M | | |
| | | Z1W | | |
| | | Z1N | | |
| | | Z1P | | |
| | | Z1Q | | |
| | | Z1R | | |
| | | Z1Y | | |
| | | Z1S | | |
| | | Z1T | | |
| | | Z2K | | |
| | | Z2L | | |
| | | Z2M | | |
| | | Z2N | | |
| | | Z2P | | |
| | | Z2Q | | |
| | | Z2R | | |
| | | Z2S | | |
| | | Z2W | | |
| | | Z2T | | |
| | | Z3A | | |
| | | Z3B | | |
| | | Z3C | | |
| | | Z3D | | |
| | | Z3E | | |
| | | Z3F | | |
| | | Z3G | | |
| | | Z3H | | |
| | | Z3V | | |
| | | Z3J | | |

### VX222 Valve type: N.C.

| Size, Valve type, Fluid | Body material, Port size | Voltage, Electrical entry, Electrical options | Other options | With bracket |
|---|---|---|---|---|
| VX222 | A | A | Nil | Nil |
| | B | B | A | XB |
| | D | C | B | |
| | E | D | C | |
| | H | E | D | |
| | J | F | E | |
| | L | M | F | |
| | M | N | G | |
| | | P | H | |
| | | Q | K | |
| | | R | L | |
| | | S | Z | |
| | | T | | |
| | | U | | |
| | | V | | |
| | | W | | |
| | | Y | | |
| | | Z1A | | |
| | | Z1B | | |
| | | Z1C | | |
| | | Z1U | | |
| | | Z1D | | |
| | | Z1E | | |
| | | Z1K | | |
| | | Z1L | | |
| | | Z1M | | |
| | | Z1W | | |
| | | Z1N | | |
| | | Z1P | | |
| | | Z1Q | | |
| | | Z1R | | |
| | | Z1Y | | |
| | | Z1S | | |
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| | | Z2K | | |
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| | | Z3G | | |
| | | Z3H | | |
| | | Z3V | | |
| | | Z3J | | |

### VX232 Valve type: N.C.

| Size, Valve type, Fluid | Body material, Port size | Voltage, Electrical entry, Electrical options | Other options | With bracket |
|---|---|---|---|---|
| VX232 | A | A | Nil | Nil |
| | B | B | A | XB |
| | C | C | B | |
| | D | D | C | |
| | E | E | D | |
| | F | F | E | |
| | G Note) | M | F | |
| | H | N | G | |
| | J | P | H | |
| | K | Q | K | |
| | L | R | L | |
| | M | S | Z | |
| | N | T | | |
| | P Note) | U | | |
| | | V | | |
| | | W | | |
| | | Y | | |
| | | Z1A | | |
| | | Z1B | | |
| | | Z1C | | |
| | | Z1U | | |
| | | Z1D | | |
| | | Z1E | | |
| | | Z1K | | |
| | | Z1L | | |
| | | Z1M | | |
| | | Z1W | | |
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| | | Z1Q | | |
| | | Z1R | | |
| | | Z1Y | | |
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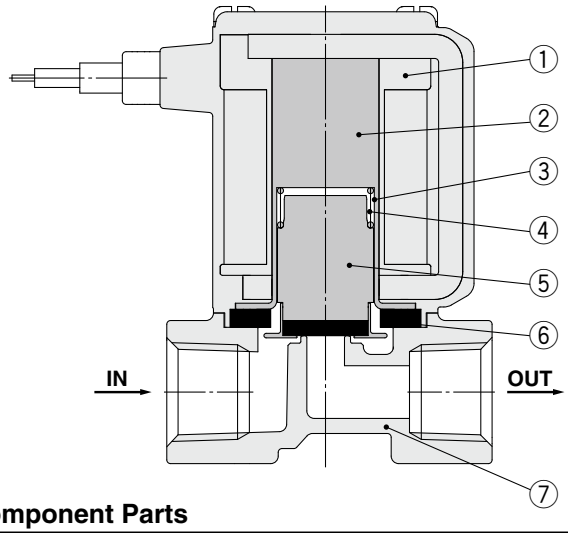
Note) Body material/ Port size: Since "with bracket" setting is not provided on G and P, "XB" cannot be selected.

Refer to pages 21 to 23 for electrical options, other options, and bracket/electrical entry direction.

## Construction/Single Unit

### Normally Closed (N.C.)

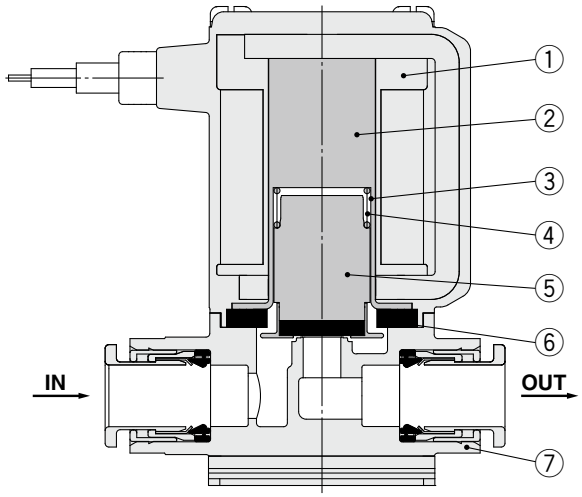
### Body material: Aluminum, C37, Stainless steel




**Component Parts**

| No. | Description | Material |
|---|---|---|
| 1 | **Solenoid coil** | Cu + Fe + Resin |
| 2 | **Core** | Fe |
| 3 | **Tube** | Stainless steel |
| 4 | **Spring** | Stainless steel |
| 5 | **Armature assembly** | NBR, FKM, Stainless steel |
| 6 | **Seal** | NBR, FKM |
| 7 | **Body** | Aluminum, C37, Stainless steel |

### Body material: Resin

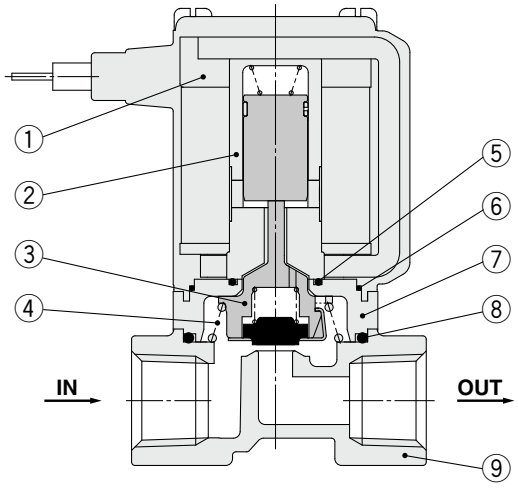



**Component Parts**

| No. | Description | Material |
|---|---|---|
| 1 | **Solenoid coil** | Cu + Fe + Resin |
| 2 | **Core** | Fe |
| 3 | **Tube** | Stainless steel |
| 4 | **Spring** | Stainless steel |
| 5 | **Armature assembly** | NBR, FKM, Stainless steel |
| 6 | **Seal** | NBR, FKM |
| 7 | **Body** | Resin (PBT) |

### Normally Open (N.O.)

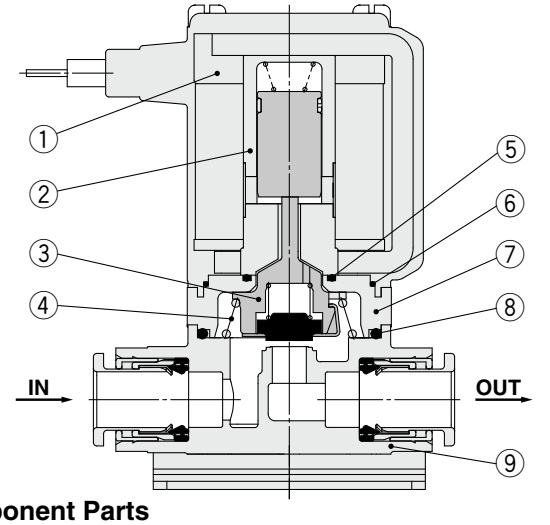
### Body material: Aluminum, C37, Stainless steel




**Component Parts**

| No. | Description | Material |
|---|---|---|
| 1 | **Solenoid coil** | Cu + Fe + Resin |
| 2 | **Sleeve assembly** | Stainless steel, Resin (PPS) |
| 3 | **Push rod assembly** | Resin (PPS), Stainless steel, NBR, FKM |
| 4 | **Spring** | Stainless steel |
| 5 | **O-ring A** | NBR, FKM |
| 6 | **O-ring B** | NBR, FKM |
| 7 | **Adapter** | Resin (PPS) |
| 8 | **O-ring C** | NBR, FKM |
| 9 | **Body** | Aluminum, C37, Stainless steel |

### Body material: Resin




**Component Parts**

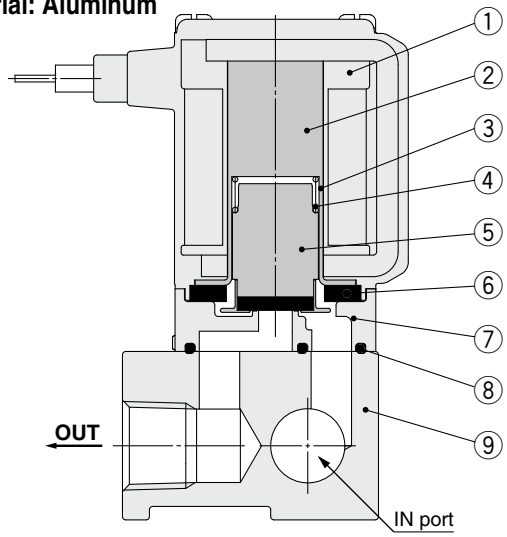
| No. | Description | Material |
|---|---|---|
| 1 | **Solenoid coil** | Cu + Fe + Resin |
| 2 | **Sleeve assembly** | Stainless steel, Resin (PPS) |
| 3 | **Push rod assembly** | Resin (PPS), Stainless steel, NBR, FKM |
| 4 | **Spring** | Stainless steel |
| 5 | **O-ring A** | NBR, FKM |
| 6 | **O-ring B** | NBR, FKM |
| 7 | **Adapter** | Resin (PPS) |
| 8 | **O-ring C** | NBR, FKM |
| 9 | **Body** | Resin (PBT) |

## Construction/Manifold

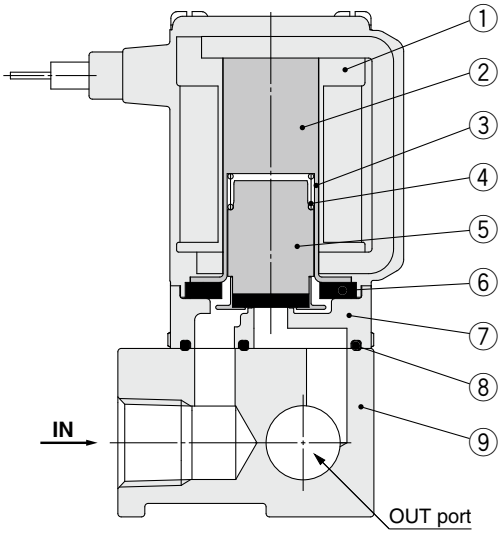
### Normally Closed (N.C.)

**Base material: Aluminum**

**Common SUP type (for air)**




**Individual SUP type (for medium vacuum)**



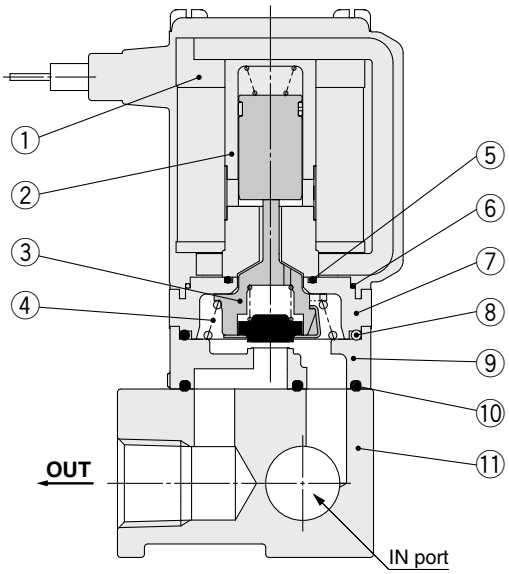

#### Component Parts

| No. | Description | Material |
|---|---|---|
| 1 | **Solenoid coil** | Cu + Fe + Resin |
| 2 | **Core** | Fe |
| 3 | **Tube** | Stainless steel |
| 4 | **Spring** | Stainless steel |
| 5 | **Armature assembly** | NBR, FKM, Stainless steel |
| 6 | **Seal** | NBR, FKM |
| 7 | **Body** | Resin (PPS) |
| 8 | **Gasket** | NBR, FKM |
| 9 | **Base** | Aluminum |

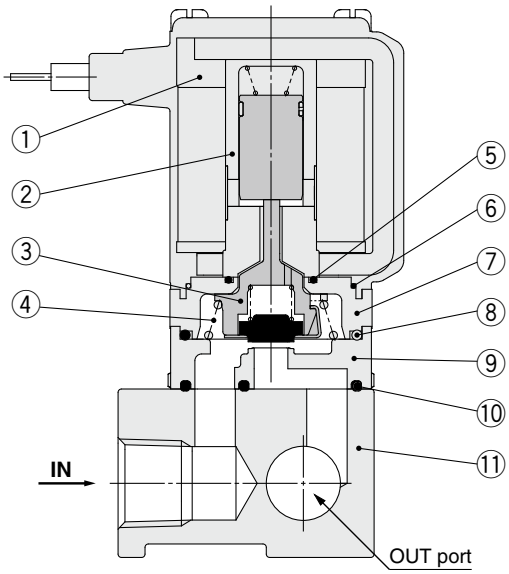
### Normally Open (N.O.)

**Base material: Aluminum**

**Common SUP type (for air)**




**Individual SUP type (for medium vacuum)**




#### Component Parts

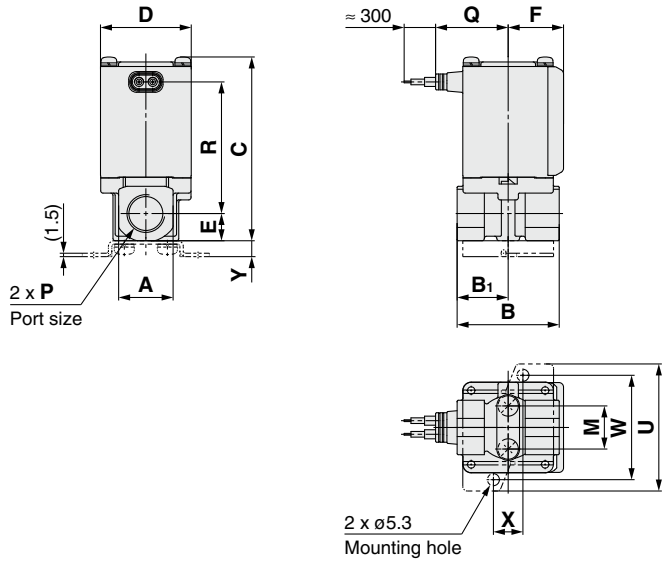
| No. | Description | Material |
|---|---|---|
| 1 | **Solenoid coil** | Cu + Fe + Resin |
| 2 | **Sleeve assembly** | Stainless steel, Resin (PPS) |
| 3 | **Push rod assembly** | Resin (PPS), Stainless steel, NBR, FKM |
| 4 | **Spring** | Stainless steel |
| 5 | **O-ring A** | NBR, FKM |
| 6 | **O-ring B** | NBR, FKM |

| No. | Description | Material |
|---|---|---|
| 7 | **Adapter** | Resin (PPS) |
| 8 | **O-ring C** | NBR, FKM |
| 9 | **Body** | Resin (PPS) |
| 10 | **Gasket** | NBR, FKM |
| 11 | **Base** | Aluminum |

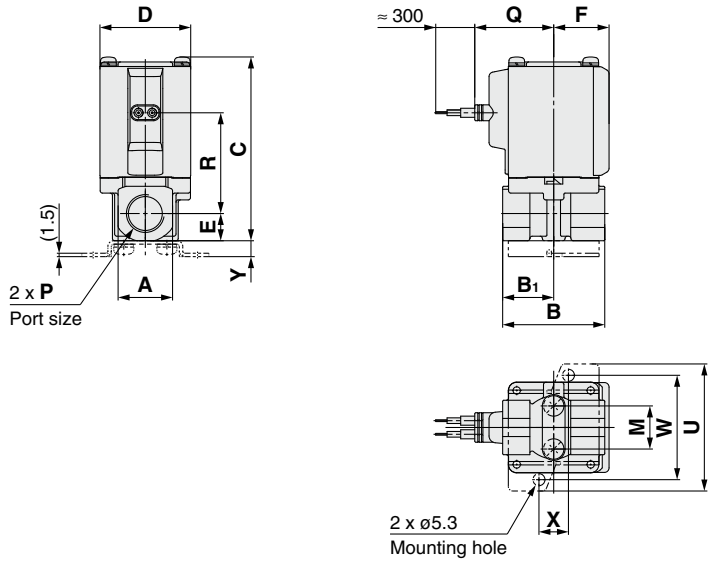
For Air

## Dimensions/Body Material: Aluminum

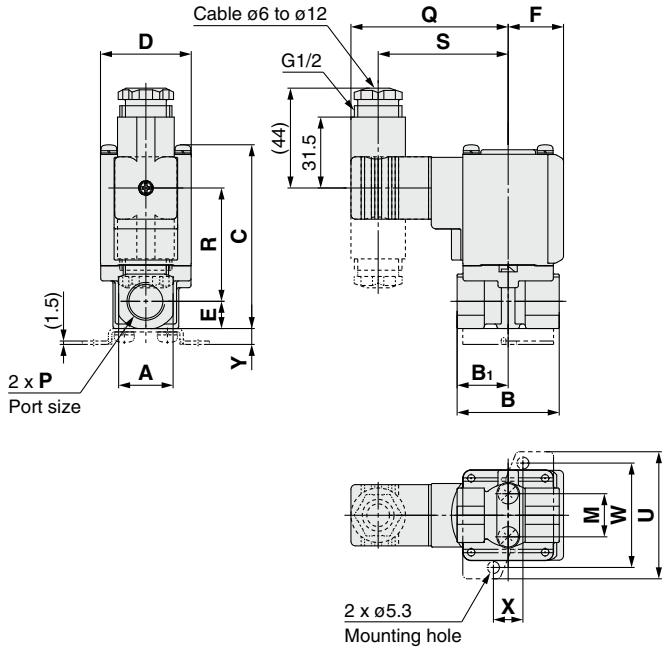
### Grommet



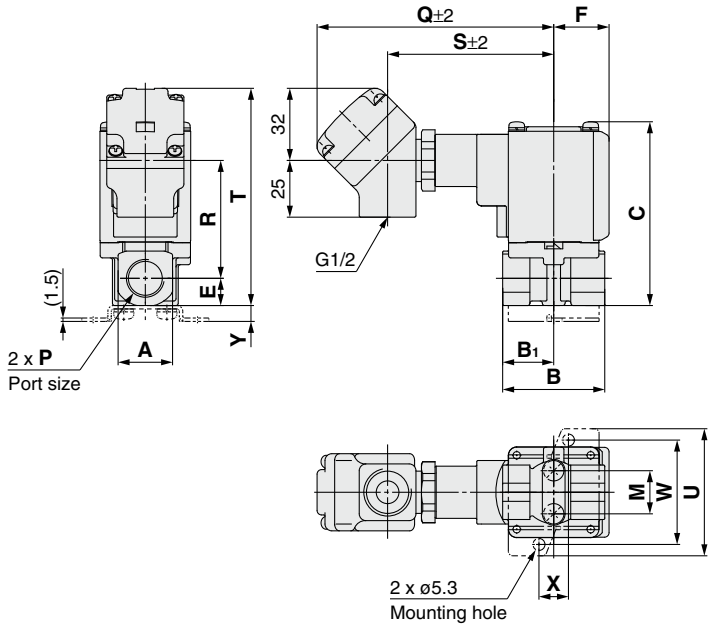

### Grommet (with surge voltage suppressor)




### DIN terminal




### Conduit terminal




(mm)

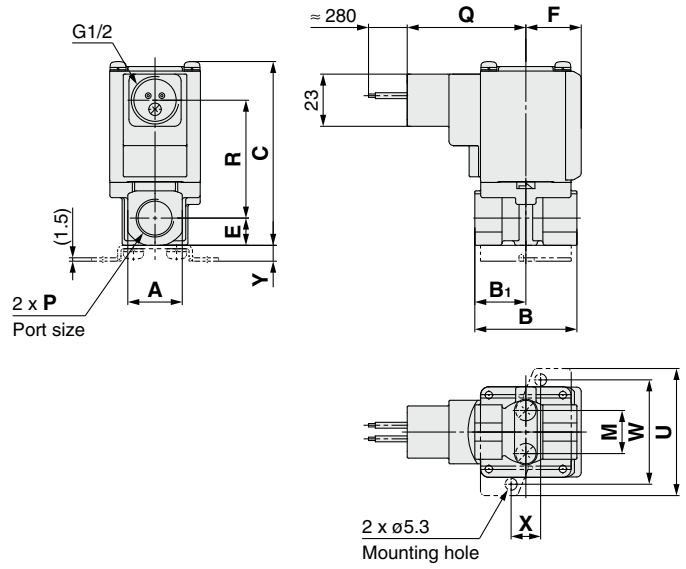
| Size | Port size P | A | B | B1 | C | D | E | F | Mounting bracket dimensions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | U | W | X | Y |
| 1 | 1/8, 1/4 | 19 | 43 | 21 | 61 (67) | 30 | 9.5 | 20 | 12.8 | 46 | 36 | 11 | 6 |
| 2 | 1/4, 3/8 | 24 | 45 | 22.5 | 76 (84) | 35 | 12 | 22 | 19 | 56 | 46 | 13 | 7 |
| 3 | 1/4, 3/8 | 24 | 45 | 22.5 | 81 (89) | 40 | 12 | 24.5 | 19 | 56 | 46 | 13 | 7 |
| | 1/2 | 30 | 50 | 25 | 86.5 | 40 | 15 | 24.5 | — | — | — | — | — |

| Size | Port size P | Electrical entry | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Grommet | | Grommet (with surge voltage suppressor) | | DIN terminal | | | Conduit terminal | | | |
| | | Q | R | Q | R | Q | R | S | Q | R | S | T |
| 1 | 1/8, 1/4 | 27 | 42 (47.5) | 30 | 28.5 (34) | 64.5 | 34 (39.5) | 52.5 | 99.5 | 36 (41.5) | 68.5 | 77 (83) |
| 2 | 1/4, 3/8 | 29.5 | 53.5 (61.5) | 32.5 | 39.5 (47.5) | 67 | 45 (53) | 55 | 102 | 47 (55) | 71 | 91 (99) |
| 3 | 1/4, 3/8 | 32 | 58 (66) | 35 | 44.5 (52.5) | 69.5 | 50 (58) | 57.5 | 104.5 | 52 (60) | 73.5 | 96 (104) |
| | 1/2 | 32 | 61 | 35 | 47.5 | 69.5 | 53 | 57.5 | 104.5 | 55 | 73.5 | 101.5 |

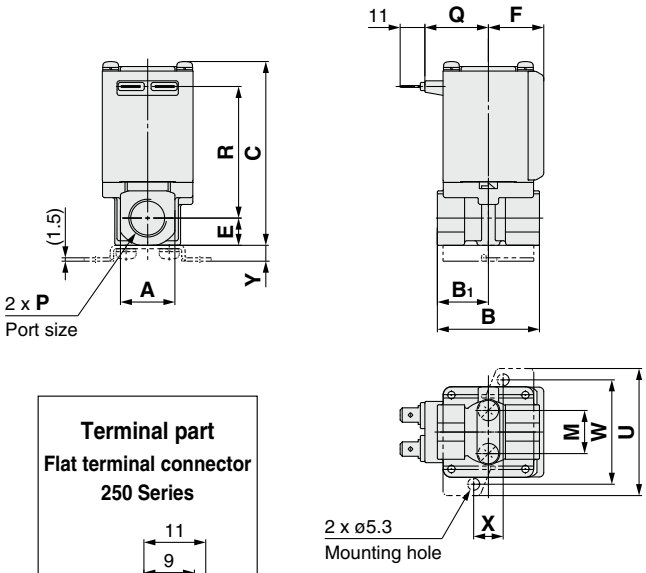
( ): Denotes the Normally Open (N.O.) dimensions.

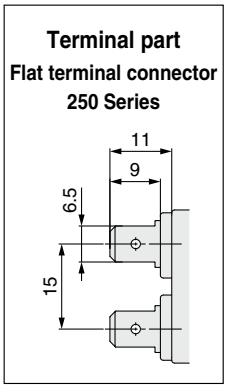
## Dimensions/Body Material: Aluminum

### Conduit




### Flat terminal type




(mm)

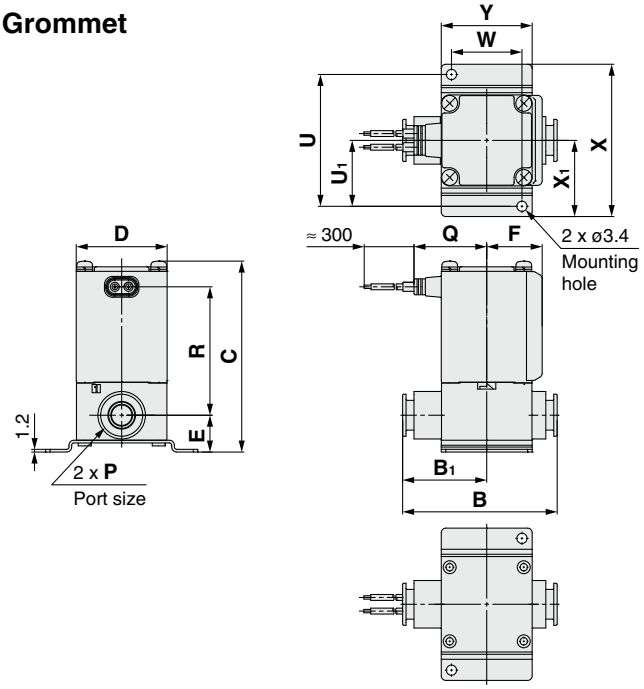
| Size | Port size P | A | B | $B_1$ | C | D | E | F | Mounting bracket dimensions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | U | W | X | Y |
| 1 | 1/8, 1/4 | 19 | 43 | 21 | 61 (67) | 30 | 9.5 | 20 | 12.8 | 46 | 36 | 11 | 6 |
| 2 | 1/4, 3/8 | 24 | 45 | 22.5 | 76 (84) | 35 | 12 | 22 | 19 | 56 | 46 | 13 | 7 |
| 3 | 1/4, 3/8 | 24 | 45 | 22.5 | 81 (89) | 40 | 12 | 24.5 | 19 | 56 | 46 | 13 | 7 |
| | 1/2 | 30 | 50 | 25 | 86.5 | 40 | 15 | 24.5 | — | — | — | — | — |

| Size | Port size P | Electrical entry | | | |
|---|---|---|---|---|---|
| | | Conduit | | Flat terminal type | |
| | | Q | R | Q | R |
| 1 | 1/8, 1/4 | 47.5 | 36 (41.5) | 23 | 42 (47.5) |
| 2 | 1/4, 3/8 | 50 | 47 (55) | 25.5 | 53.5 (61.5) |
| 3 | 1/4, 3/8 | 52.5 | 52 (60) | 28 | 58 (66) |
| | 1/2 | 52.5 | 55 | 28 | 61 |

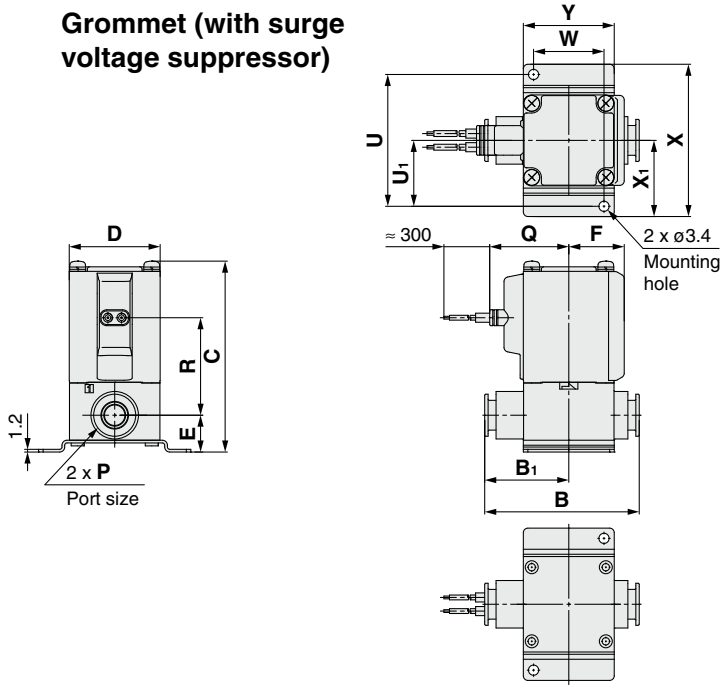
( ): Denotes the Normally Open (N.O.) dimensions.

## Dimensions/Body Material: Resin

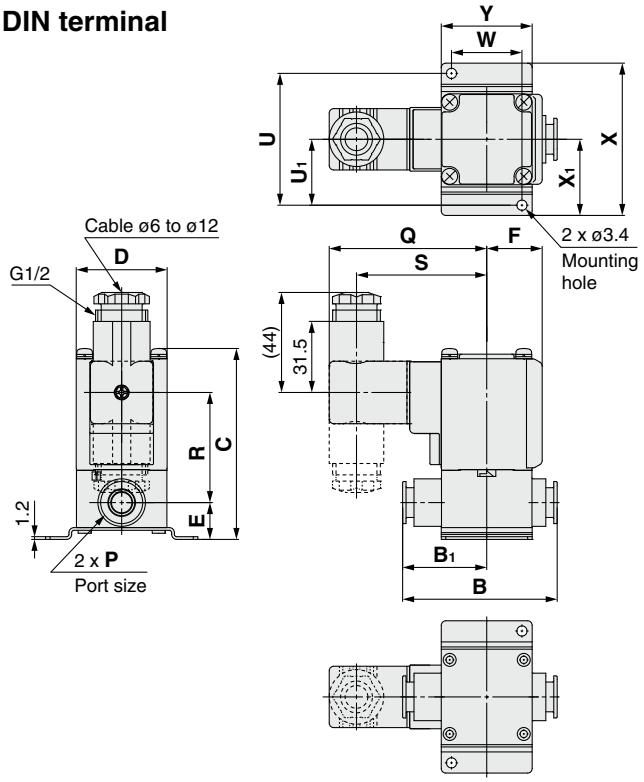
### Grommet



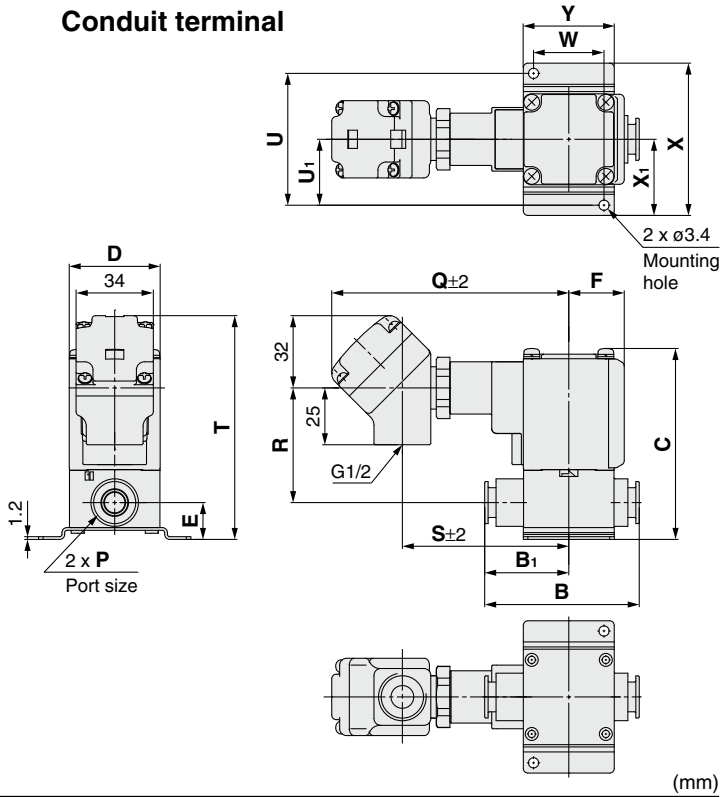

### Grommet (with surge voltage suppressor)




### DIN terminal




### Conduit terminal




(mm)

| Size | One-touch fitting **P** | **B** | **B1** | **C** | **D** | **E** | **F** | Mounting bracket dimensions | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | **U** | **U1** | **W** | **X** | **X1** | **Y** |
| **1** | ø6, ø8 | 53.5 | 29 | 65.5 (71.5) | 30 | 13.5 | 20 | 45 | 22.5 | 22 | 52 | 26 | 30 |
| **2** | ø8, ø10 | 66 | 36 | 76.5 (84.5) | 35 | 15 | 22 | 53 | 26.5 | 27 | 62 | 31 | 35 |
| **3** | ø10, ø12 | 68 | 37 | 84 (92) | 40 | 16.5 | 24.5 | 58 | 29 | 31 | 67 | 33.5 | 40 |

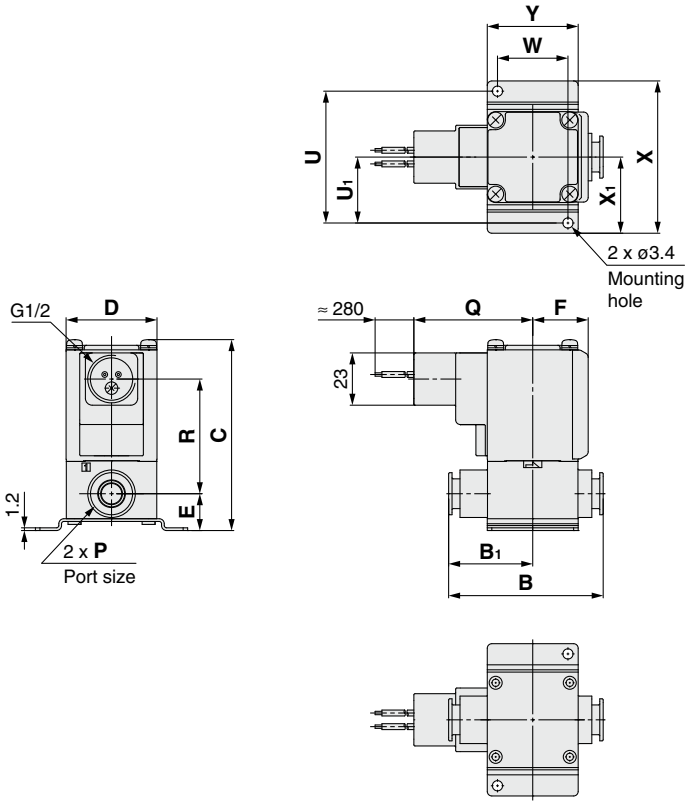
| Size | One-touch fitting **P** | Electrical entry | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Grommet | | Grommet (with surge voltage suppressor) | | DIN terminal | | | Conduit terminal | | | |
| | | **Q** | **R** | **Q** | **R** | **Q** | **R** | **S** | **Q** | **R** | **S** | **T** |
| **1** | ø6, ø8 | 27 | 42.5 (48) | 30 | 29 (34.5) | 64.5 | 34.5 (40) | 52.5 | 99.5 | 36.5 (42) | 68.5 | 81.5 (87) |
| **2** | ø8, ø10 | 29.5 | 51 (59) | 32.5 | 37 (45) | 67 | 43 (50.5) | 55 | 102 | 45 (52.5) | 71 | 91.5 (99.5) |
| **3** | ø10, ø12 | 32 | 56.5 (64.5) | 35 | 43 (51) | 69.5 | 48.5 (56.5) | 57.5 | 104.5 | 50.5 (58.5) | 73.5 | 98.5 (106.5) |

( ): Denotes the Normally Open (N.O.) dimensions.

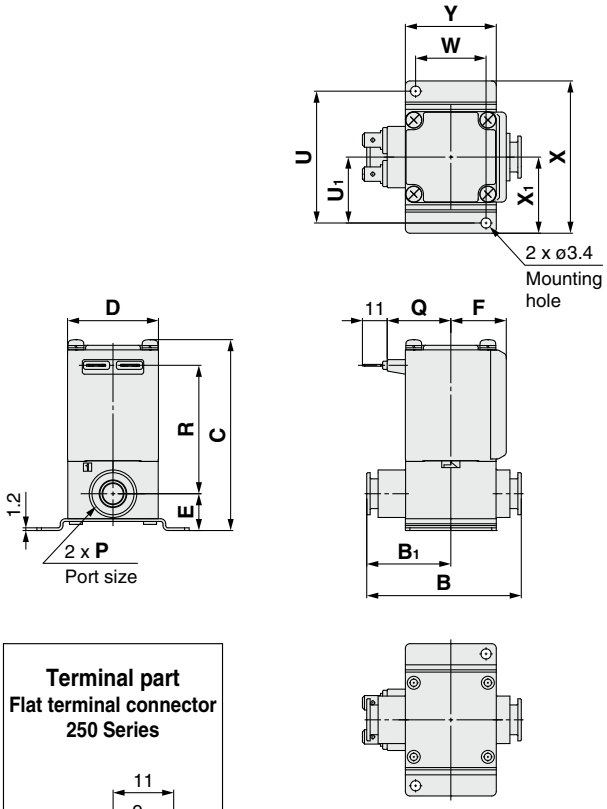
**For information on handling One-touch fittings and appropriate tubing, refer to page 48 and KQ2 series One-touch fittings in Best Pneumatics No. 6.**
**The KQ2 series information can be downloaded from the following SMC website, http://www.smcworld.com**

## Dimensions/Body Material: Resin

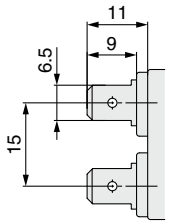
### Conduit




### Flat terminal




**Terminal part**
**Flat terminal connector**
**250 Series**




(mm)

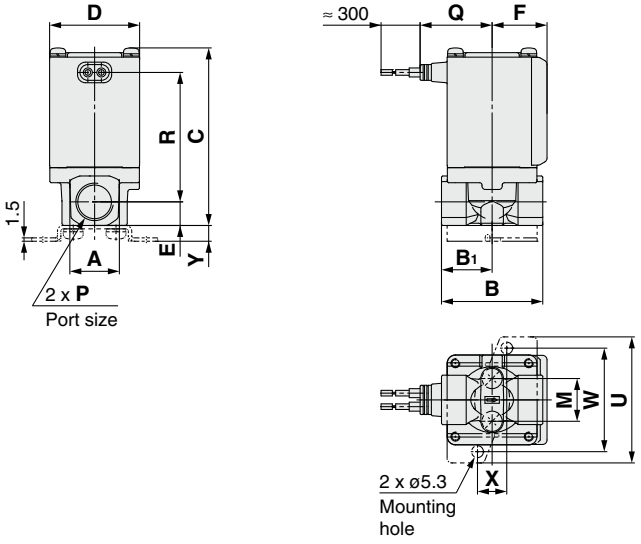
| Size | One-touch fitting **P** | **B** | **B1** | **C** | **D** | **E** | **F** | Mounting bracket dimensions | | | | | | Electrical entry | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Conduit | | Flat terminal | |
| | | | | | | | | **U** | **U1** | **W** | **X** | **X1** | **Y** | **Q** | **R** | **Q** | **R** |
| **1** | ø6, ø8 | 53.5 | 29 | 65.5 (71.5) | 30 | 13.5 | 20 | 45 | 22.5 | 22 | 52 | 26 | 30 | 47.5 | 36.5 (42) | 23 | 42.5 (48) |
| **2** | ø8, ø10 | 66 | 36 | 76.5 (84.5) | 35 | 15 | 22 | 53 | 26.5 | 27 | 62 | 31 | 35 | 50 | 45 (52.5) | 25.5 | 51 (59) |
| **3** | ø10, ø12 | 68 | 37 | 84 (92) | 40 | 16.5 | 24.5 | 58 | 29 | 31 | 67 | 33.5 | 40 | 52.5 | 50.5 (58.5) | 28 | 56.5 (64.5) |

( ): Denotes the Normally Open (N.O.) dimensions.

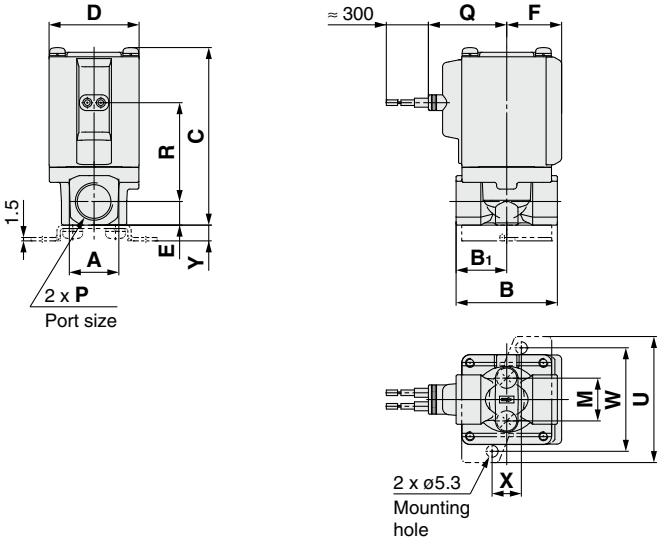
For Medium Vacuum, Water, Oil

## Dimensions/Body Material: C37, Stainless Steel

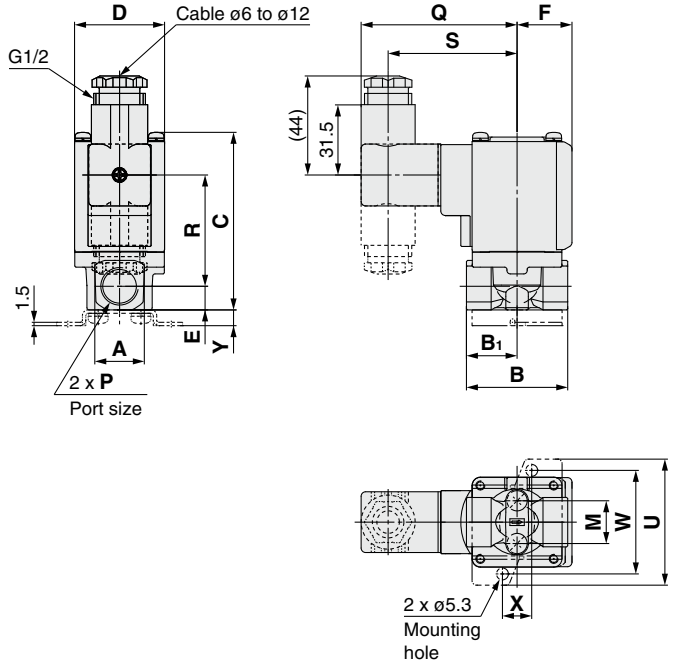
### Grommet



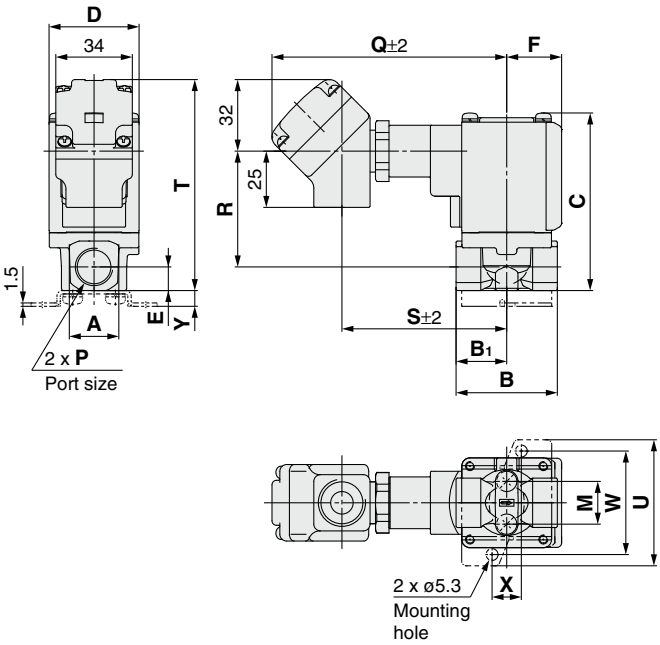

### Grommet (with surge voltage suppressor)




### DIN terminal




### Conduit terminal




(mm)

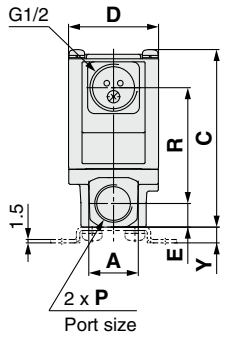
| Size | Port size P | A | B | B1 | C | D | E | F | Mounting bracket dimensions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | U | W | X | Y |
| 1 | 1/8, 1/4 | 19 | 43 | 21 | 61 (67) | 30 | 9.5 | 20 | 12.8 | 46 | 36 | 11 | 6 |
| 2 | 1/4, 3/8 | 22 | 45 | 22.5 | 74.5 (82.5) | 35 | 10.5 | 22 | 19 | 56 | 46 | 13 | 7 |
| 3 | 1/4, 3/8 | 22 | 45 | 22.5 | 79 (87) | 40 | 10.5 | 24.5 | 19 | 56 | 46 | 13 | 7 |
| | 1/2 | 29.5 | 50 | 25 | 85.5 | 40 | 14 | 24.5 | — | — | — | — | — |

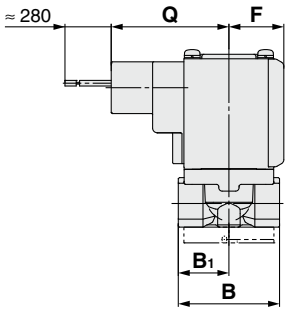
| Size | Port size P | Electrical entry | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Grommet | | Grommet (with surge voltage suppressor) | | DIN terminal | | | Conduit terminal | | | |
| | | Q | R | Q | R | Q | R | S | Q | R | S | T |
| 1 | 1/8, 1/4 | 27 | 42 (47.5) | 30 | 28.5 (34) | 64.5 | 34 (39.5) | 52.5 | 99.5 | 36 (41.5) | 68.5 | 77 (83) |
| 2 | 1/4, 3/8 | 29.5 | 53.5 (61.5) | 32.5 | 39.5 (47.5) | 67 | 45 (53) | 55 | 102 | 47 (55) | 71 | 89.5 (97.5) |
| 3 | 1/4, 3/8 | 32 | 57.5 (65.5) | 35 | 44 (52) | 69.5 | 49.5 (57.5) | 57.5 | 104.5 | 51.5 (59.5) | 73.5 | 94 (102) |
| | 1/2 | 32 | 61 | 35 | 47.5 | 69.5 | 53 | 57.5 | 104.5 | 55 | 73.5 | 100.5 |

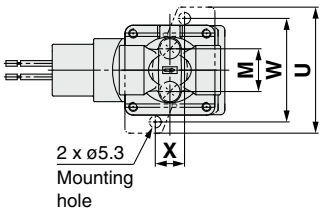
( ): Denotes the Normally Open (N.O.) dimensions.

## Dimensions/Body Material: C37, Stainless Steel

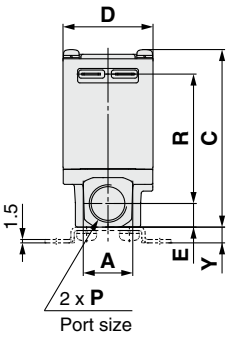
### Conduit

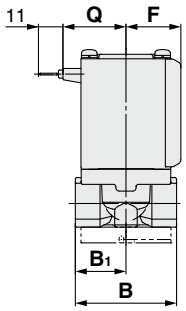


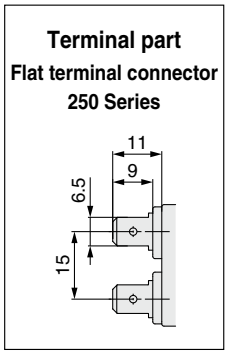



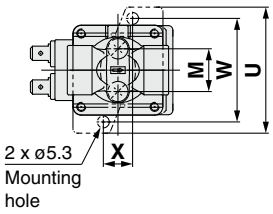




### Flat terminal




(mm)

| Size | Port size P | A | B | $B_1$ | C | D | E | F | Mounting bracket dimensions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | U | W | X | Y |
| 1 | 1/8, 1/4 | 19 | 43 | 21 | 61 (67) | 30 | 9.5 | 20 | 12.8 | 46 | 36 | 11 | 6 |
| 2 | 1/4, 3/8 | 22 | 45 | 22.5 | 74.5 (82.5) | 35 | 10.5 | 22 | 19 | 56 | 46 | 13 | 7 |
| 3 | 1/4, 3/8 | 22 | 45 | 22.5 | 79 (87) | 40 | 10.5 | 24.5 | 19 | 56 | 46 | 13 | 7 |
| | 1/2 | 29.5 | 50 | 25 | 85.5 | 40 | 14 | 24.5 | — | — | — | — | — |

| Size | Port size P | Electrical entry | | | |
|---|---|---|---|---|---|
| | | Conduit | | Flat terminal | |
| | | Q | R | Q | R |
| 1 | 1/8, 1/4 | 47.5 | 36 (41.5) | 23 | 42 (47.5) |
| 2 | 1/4, 3/8 | 50 | 47 (55) | 25.5 | 53.5 (61.5) |
| 3 | 1/4, 3/8 | 52.5 | 51.5 (59.5) | 28 | 57.5 (65.5) |
| | 1/2 | 52.5 | 55 | 28 | 61 |

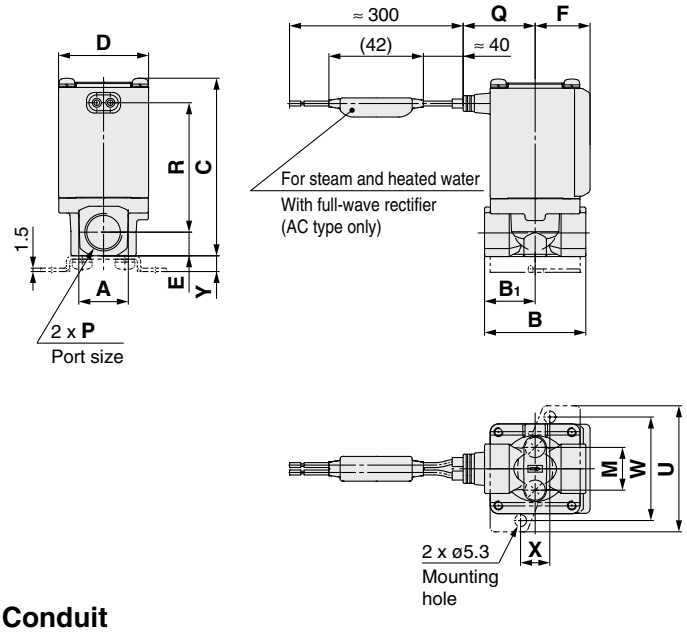
( ): Denotes the Normally Open (N.O.) dimensions.

**For Steam**

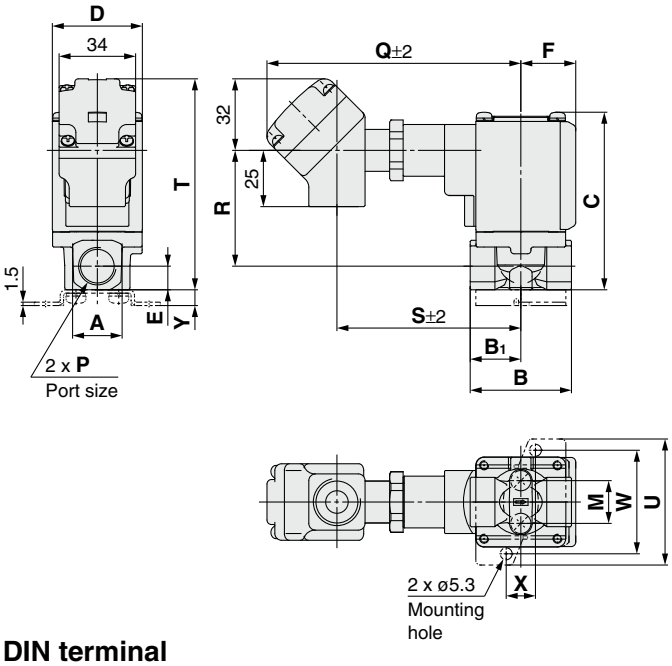
∗ Can be used with heated water.

## Dimensions/Body Material: C37, Stainless Steel

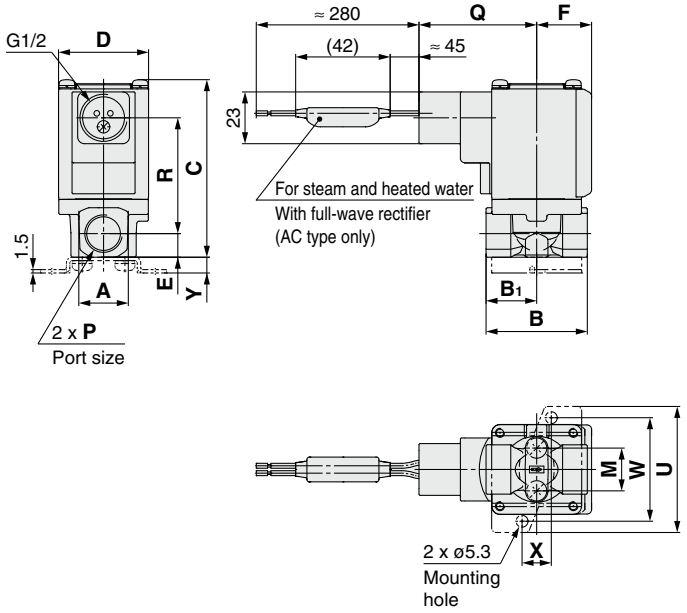
### Grommet



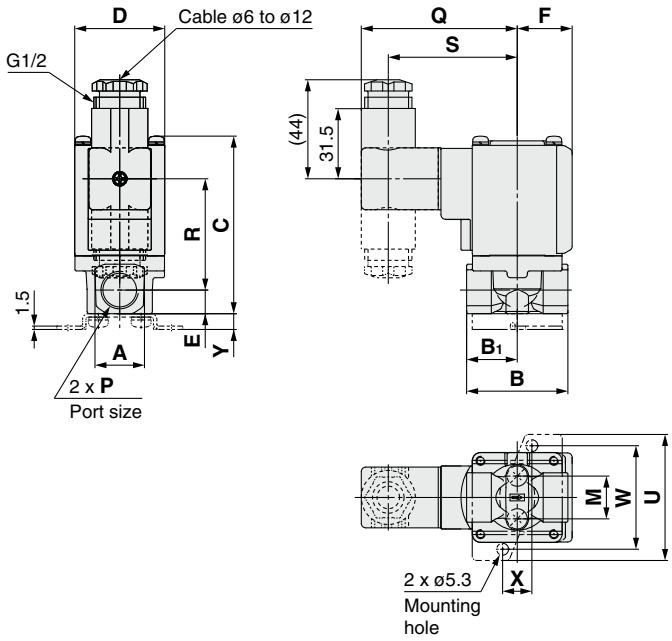

### Conduit terminal




### Conduit




### DIN terminal



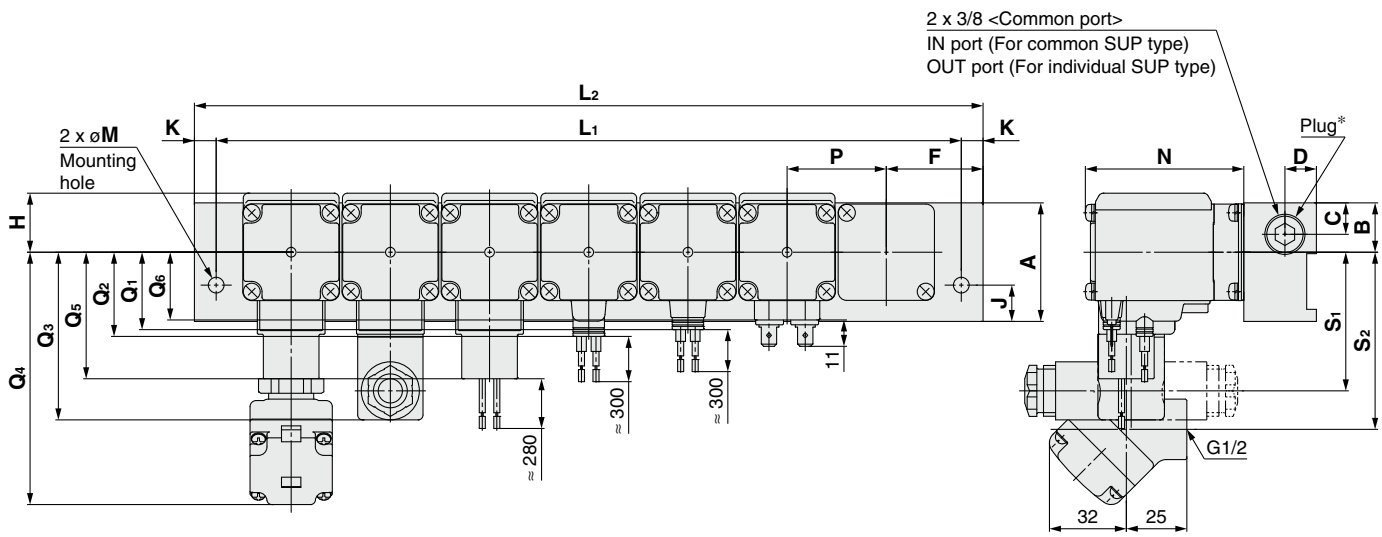

(mm)

| Size | Port size P | A | B | $B_1$ | C | D | E | F | Mounting bracket dimensions | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M | U | W | X | Y |
| 1 | 1/8, 1/4 | 19 | 43 | 21 | 61 (67) | 30 | 9.5 | 20 | 12.8 | 46 | 36 | 11 | 6 |
| 2 | 1/4, 3/8 | 22 | 45 | 22.5 | 74.5 (82.5) | 35 | 10.5 | 22 | 19 | 56 | 46 | 13 | 7 |
| 3 | 1/4, 3/8 | 22 | 45 | 22.5 | 79 (87) | 40 | 10.5 | 24.5 | 19 | 56 | 46 | 13 | 7 |
| | 1/2 | 29.5 | 50 | 25 | 85.5 | 40 | 14 | 24.5 | — | — | — | — | — |

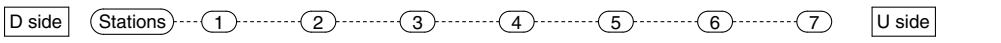
| Size | Port size P | Electrical entry | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Grommet | | Conduit terminal | | | | Conduit | | DIN terminal | | |
| | | Q | R | Q | R | S | T | Q | R | Q | R | S |
| 1 | 1/8, 1/4 | 27 | 42 (47.5) | 108 | 36 (41.5) | 77 | 77 (83) | 47.5 | 36 (41.5) | 64.5 | 34 (39.5) | 52.5 |
| 2 | 1/4, 3/8 | 29.5 | 53.5 (61.5) | 110.5 | 47 (55) | 79.5 | 89.5 (97.5) | 50 | 47 (55) | 67 | 45 (53) | 55 |
| 3 | 1/4, 3/8 | 32 | 57.5 (65.5) | 113 | 51.5 (59.5) | 82 | 94 (102) | 52.5 | 51.5 (59.5) | 69.5 | 49.5 (57.5) | 57.5 |
| | 1/2 | 32 | 61 | 113 | 55 | 82 | 100.5 | 52.5 | 55 | 69.5 | 53 | 57.5 |

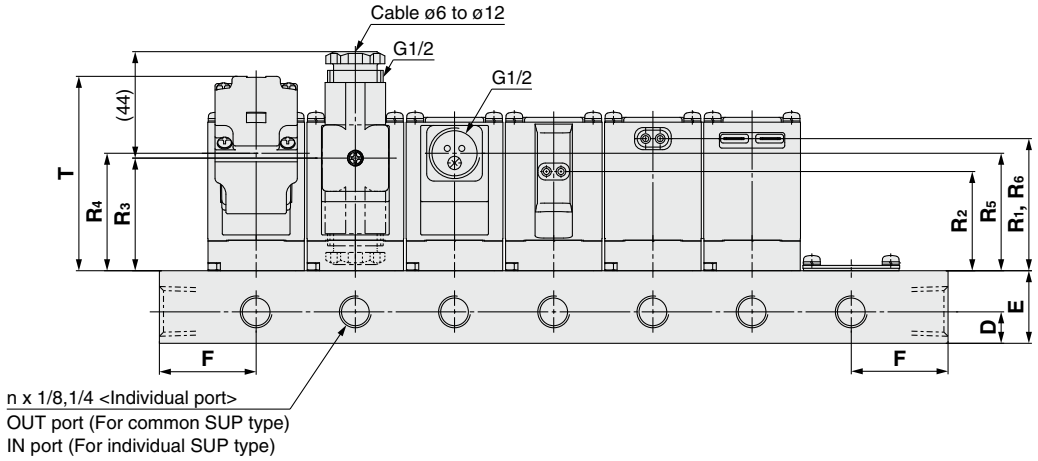
( ): Denotes the Normally Open (N.O.) dimensions.
Flat terminal is not available for valves for steam and heated water.

## Dimensions/Manifold/Base Material: Aluminum




* D side port does not have a plug.




(mm)

| Size | Dimensions | n (stations) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 | $L_1$ | 86 | 122 | 158 | 194 | 230 | 266 | 302 | 338 | 374 |
| | $L_2$ | 100 | 136 | 172 | 208 | 244 | 280 | 316 | 352 | 388 |
| 2 | $L_1$ | 90 | 126 | 162 | 198 | 234 | 270 | 306 | 342 | 378 |
| | $L_2$ | 108 | 144 | 180 | 216 | 252 | 288 | 324 | 360 | 396 |
| 3 | $L_1$ | 103 | 144 | 185 | 226 | 267 | 308 | 349 | 390 | 431 |
| | $L_2$ | 121 | 162 | 203 | 244 | 285 | 326 | 367 | 408 | 449 |

| Size | A | B | C | D | E | F | H | J | K | M | N | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 38 | 15.5 | 10.5 | 11 | 25 | 32 | 20 | 12 | 7 | 6.5 | 50.5 (56.5) | 36 |
| 2 | 49 | 18 | 13 | 13 | 30 | 36 | 22 | 15 | 9 | 8.5 | 60.5 (68.5) | 36 |
| 3 | 49 | 20.5 | 13 | 13 | 30 | 40 | 24.5 | 15 | 9 | 8.5 | 65.5 (73.5) | 41 |

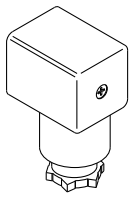
| Size | Grommet | | Grommet (With surge voltage suppressor) | | DIN terminal* | | | Conduit terminal | | | | Conduit | | Flat terminal | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $Q_1$ | $R_1$ | $Q_2$ | $R_2$ | $Q_3$ | $R_3$ | $S_1$ | $Q_4$ | $R_4$ | $S_2$ | T | $Q_5$ | $R_5$ | $Q_6$ | $R_6$ |
| 1 | 27 | 40.5 (46.5) | 30 | 27 (33) | 64.5 | 32.5 (38.5) | 52.5 | 99.5 | 34.5 (40.5) | 68.5 | 66.5 (72) | 47.5 | 34.5 (40.5) | 23 | 40.5 (46.5) |
| 2 | 29.5 | 49.5 (57.5) | 32.5 | 36 (44) | 67 | 41.5 (49.5) | 55 | 102 | 43.5 (51.5) | 71 | 75.5 (83.5) | 50 | 43.5 (51.5) | 25.5 | 49.5 (57.5) |
| 3 | 32 | 54.5 (63) | 35 | 41 (49) | 69.5 | 46.5 (54.5) | 57.5 | 104.5 | 48.5 (56.5) | 73.5 | 80.5 (89.5) | 52.5 | 48.5 (56.5) | 28 | 54.5 (63) |

( ): Denotes the Normally Open (N.O.) dimensions.

* When using a DIN terminal that faces downward, be careful of interference in the electrical wires and piping.

## Replacement Parts

### ● DIN Connector Part No.



**<For Class B Coil>**

| Electrical option | Rated voltage | Connector part no. |
|---|---|---|
| None | 24 VDC | **C18312G6GCU** |
| | 12 VDC | |
| | 100 VAC | |
| | 110 VAC | |
| | 200 VAC | |
| | 220 VAC | |
| | 230 VAC | |
| | 240 VAC | |
| | 24 VAC | |
| | 48 VAC | |
| With light | 24 VDC | **GDM2A-L5** |
| | 12 VDC | **GDM2A-L6** |
| | 100 VAC | **GDM2A-L1** |
| | 110 VAC | **GDM2A-L1** |
| | 200 VAC | **GDM2A-L2** |
| | 220 VAC | **GDM2A-L2** |
| | 230 VAC | **GDM2A-L2** |
| | 240 VAC | **GDM2A-L2** |
| | 24 VAC | **GDM2A-L5** |
| | 48 VAC | **GDM2A-L15** |

**<For Class H Coil>**

| Electrical option | Rated voltage | Connector part no. |
|---|---|---|
| None | 24 VDC | **GDM2A-G-S5** |
| | 100 VAC | **GDM2A-R** |
| | 110 VAC | |
| | 200 VAC | |
| | 220 VAC | |
| | 230 VAC | |
| | 240 VAC | |
| | 24 VAC | |
| | 48 VAC | |
| With light | 24 VDC | **GDM2A-G-Z5** |
| | 100 VAC | **GDM2A-R-L1** |
| | 110 VAC | **GDM2A-R-L1** |
| | 200 VAC | **GDM2A-R-L2** |
| | 220 VAC | **GDM2A-R-L2** |
| | 230 VAC | **GDM2A-R-L2** |
| | 240 VAC | **GDM2A-R-L2** |
| | 24 VAC | **GDM2A-R-L5** |
| | 48 VAC | **GDM2A-R-L5** |

∗ Select an appropriate DIN connector suitable for the coil insulation type.

### ● Gasket Part No. for DIN Connector

**VCW20-1-29-1 (For Class B Coil)**
**VCW20-1-29-1-F (For Class H Coil)**

### ● Lead Wire Assembly for Flat Terminal (Set of 2 pcs.)

**VX021S-1-16FB**

### ● Bracket Assembly Part No. (for Metal Body)

**VX02□N−12A**

| | |
|---|---|
| 1 | For VX2$^{1}_{4}$□□ |
| 2 | For VX2$^{2}_{5}$□□ |
| | For VX2$^{3}_{6}$□□ |

∗ 2 mounting screws are shipped together with the bracket assembly.
∗ On the bottom side of the standard body, there is no female thread for mounting a bracket. Please select XNB□.

# Series VX21/22/23
# Glossary of Terms

## Pressure Terminology

**1. Maximum operating pressure differential**

The maximum pressure differential (the difference between the inlet and outlet pressure) which is allowed for operation. When the outlet pressure is 0 MPa, this becomes the maximum operating pressure.

**2. Minimum operating pressure differential**

The minimum pressure differential (the difference between the inlet pressure and outlet pressure) required to keep the main valve fully open.

**3. Maximum system pressure**

The maximum pressure that can be applied inside the pipelines (line pressure).

[The pressure differential of the solenoid valve portion must not exceed the maximum operating pressure differential.]

**4. Withstand pressure**

The pressure in which the valve must be withstood without a drop in performance after holding for one minute under prescribed pressure and returning to the operating pressure range. [value under the prescribed conditions]

## Electrical Terminology

**1. Apparent power (VA)**

Volt-ampere is the product of voltage (V) and current (A).

Power consumption (W): For AC, $W = V \cdot A \cdot \cos\theta$.

For DC, $W = V \cdot A$.

Note) $\cos\theta$ shows power factor. $\cos\theta \approx 0.9$

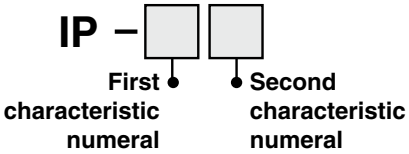
**2. Surge voltage**

A high voltage which is momentarily generated by shutting off the power in the shut-off area.

**3. Degree of protection**

A degree defined in the "JIS C 0920: Waterproof test of electric machinery/appliance and the degree of protection against the intrusion of solid foreign objects."

Verify the degree of protection for each product.




**●First Characteristics:**
**Degrees of protection against solid foreign objects**

| | |
|---|---|
| **0** | Non-protected |
| **1** | Protected against solid foreign objects of 50 mmø and greater |
| **2** | Protected against solid foreign objects of 12 mmø and greater |
| **3** | Protected against solid foreign objects of 2.5 mmø and greater |
| **4** | Protected against solid foreign objects of 1.0 mmø and greater |
| **5** | Dust-protected |
| **6** | Dust-tight |

## Electrical Terminology

**●Second Characteristics:**
**Degrees of protection against water**

| | | |
|---|---|---|
| **0** | Non-protected | — |
| **1** | Protected against vertically falling water drops | Dripproof type 1 |
| **2** | Protected against vertically falling water drops when enclosure tilted up to 15° | Dripproof type 2 |
| **3** | Protected against rainfall when enclosure tilted up to 60° | Rainproof type |
| **4** | Protected against splashing water | Splashproof type |
| **5** | Protected against water jets | Water-jet-proof type |
| **6** | Protected against powerful water jets | Powerful water-jet-proof type |
| **7** | Protected against the effects of temporary immersion in water | Immersible type |
| **8** | Protected against the effects of continuous immersion in water | Submersible type |

**Example) IP65: Dust-tight, Water-jet-proof type**

**"Water-jet-proof type" means that no water intrudes inside an equipment that could hinder from operating normally by means of applying water for 3 minutes in the prescribed manner. Take appropriate protection measures, since a device is not usable in an environment where a droplet of water is splashed constantly.**

## Others

**1. Material**

NBR: Nitrile rubber

FKM: Fluororubber

EPDM: Ethylene propylene rubber

**2. Oil-free treatment**

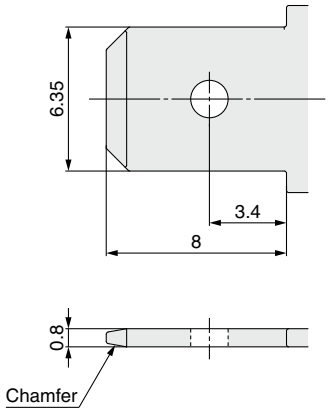
The degreasing and washing of wetted parts

**3. Symbol**

In the symbol (), when the valve is closed, flow is blocked from port 1 to port 2. However, if the pressure in port 2 is higher than port 1, the valve will not be able to block the fluid and it will flow from port 2 to port 1.

## Flat Terminal

**Flat terminal/Electrical connection size of molded coil**



# Solenoid Valve Flow-rate Characteristics
## (How to indicate flow-rate characteristics)

## 1. Indication of flow-rate characteristics

The flow-rate characteristics in equipment such as a solenoid valve etc. are indicated in their specifications as shown in Table (1).

**Table (1) Indication of Flow-rate Characteristics**

| Corresponding equipment | Indication by international standard | Other indications | Conformed standard |
|---|---|---|---|
| Pneumatic equipment | ***C*, *b*** | — | ISO 6358: 1989<br>JIS B 8390: 2000 |
| | — | ***S*** | JIS B 8390: 2000<br>Equipment: JIS B 8373, 8374, 8375, 8379, 8381 |
| | | ***Cv*** | ANSI/(NFPA)T3.21.3: 1990 |
| Process fluid control equipment | ***Av*** | — | IEC60534-2-3: 1997<br>JIS B 2005: 1995<br>Equipment: JIS B 8471, 8472, 8473 |
| | — | ***Cv*** | |

## 2. Pneumatic equipment

### 2.1 Indication according to the international standards

(1) Conformed standard

**ISO 6358: 1989 : Pneumatic fluid power—Components using compressible fluids—Determination of flow-rate characteristics**

**JIS B 8390: 2000 : Pneumatic fluid power—Components using compressible fluids—How to test flow-rate characteristics**

(2) Definition of flow-rate characteristics

The flow-rate characteristics are indicated as a result of a comparison between sonic conductance ***C*** and critical pressure ratio ***b***.

Sonic conductance ***C*** : Value which divides the passing mass flow rate of an equipment in a choked flow condition by the product of the upstream absolute pressure and the density in a standard condition.

Critical pressure ratio ***b*** : Pressure ratio (downstream pressure/upstream pressure) which will turn to a choked flow when the value is smaller than this ratio.

Choked flow : The flow in which the upstream pressure is higher than the downstream pressure and where sonic speed in a certain part of an equipment is reached.
Gaseous mass flow rate is in proportion to the upstream pressure and not dependent on the downstream pressure.

Subsonic flow : Flow greater than the critical pressure ratio

Standard condition : Air in a temperature state of 20°C, absolute pressure 0.1 MPa (= 100 kPa = 1 bar), relative humidity 65%.
It is stipulated by adding the "(ANR)" after the unit depicting air volume.
(standard reference atmosphere)
Conformed standard: ISO 8778: 1990 Pneumatic fluid power—Standard reference atmosphere, JIS B 8393: 2000: Pneumatic fluid power—Standard reference atmosphere

(3) Formula for flow rate

It is described by the practical units as following.

When $\frac{P_2 + 0.1}{P_1 + 0.1} \leq b$, **choked flow**

$$Q = 600 \times C (P_1 + 0.1) \sqrt{\frac{293}{273 + t}} \quad \cdots\cdots (1)$$

When $\frac{P_2 + 0.1}{P_1 + 0.1} > b$, **subsonic flow**

$$Q = 600 \times C (P_1 + 0.1) \sqrt{1 - \left[ \frac{\frac{P_2 + 0.1}{P_1 + 0.1} - b}{1 - b} \right]^2} \sqrt{\frac{293}{273 + t}} \quad \cdots\cdots (2)$$

***Q*** : Air flow rate [dm³/min (ANR)], dm³ (Cubic decimeter) of SI unit are also allowed to be described by L (liter). 1 dm³ = 1 L

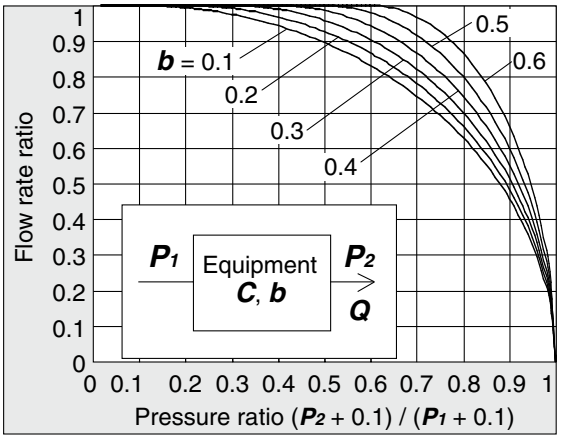
***C*** : Sonic conductance [dm³/(s·bar)]
***b*** : Critical pressure ratio [—]
***P₁*** : Upstream pressure [MPa]
***P₂*** : Downstream pressure [MPa]
***t*** : Temperature [°C]
Note) Formula of subsonic flow is the elliptic analogous curve.
Flow-rate characteristics are shown in Graph (1) For details, please make use of SMC's "Energy Saving Program."

Example)
Obtain the air flow rate for $P_1$ = 0.4 [MPa], $P_2$ = 0.3 [MPa], $t$ = 20 [°C] when a solenoid valve is performed in $C$ = 2 [dm³/(s·bar)] and $b$ = 0.3.

According to formula 1, the maximum flow rate = $600 \times 2 \times (0.4 + 0.1) \times \sqrt{\frac{293}{273 + 20}} = 600$ [dm³/min (ANR)]

Pressure ratio = $\frac{0.3 + 0.1}{0.4 + 0.1} = 0.8$

Based on Graph (1), the flow rate will be 0.7 when the pressure ratio is 0.8 and $b$ = 0.3.
Hence, flow rate = Maximum flow rate x flow rate ratio = 600 x 0.7 = 420 [dm³/min (ANR)]




**Graph (1) Flow-rate characteristics**

(4) Test method
Attach a test equipment with the test circuit shown in Fig. (1) while maintaining the upstream pressure to a certain level which does not go below 0.3 MPa. Next, measure the maximum flow to be saturated in the first place, then measure this flow rate at 80%, 60%, 40%, 20% and the upstream and downstream pressure. And then, obtain the sonic conductance $C$ from this maximum flow rate. Besides that, substitute each data of others for the subsonic flow formula to find $b$, then obtain the critical pressure ratio $b$ from that average.

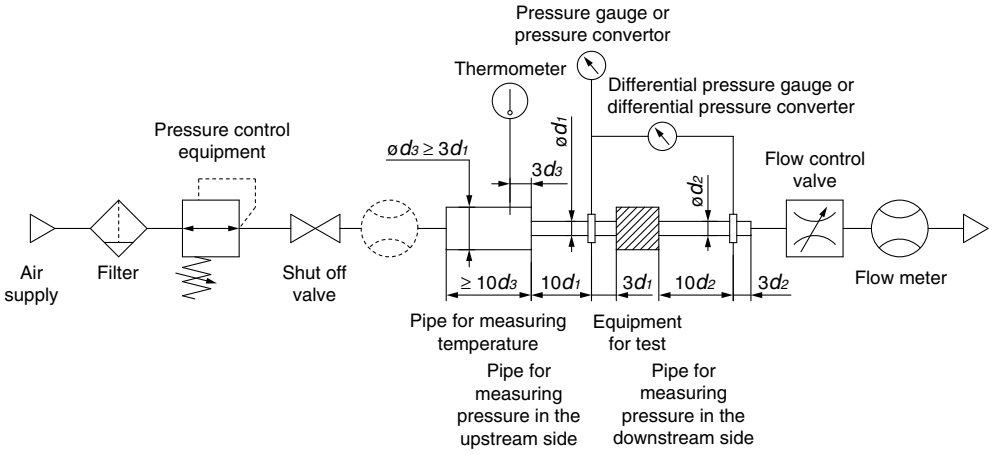



**Fig. (1) Test circuit based on ISO 6358, JIS B 8390**

### 2.2 Effective area *S*

(1) Conformed standard

**JIS B 8390: 2000: Pneumatic fluid power—Components using compressible fluids—Determination of flow rate characteristics**

**Equipment standards: JIS B 8373: 2 port solenoid valve for pneumatics**
**JIS B 8374: 3 port solenoid valve for pneumatics**
**JIS B 8375: 4 port, 5 port solenoid valve for pneumatics**
**JIS B 8379: Silencer for pneumatics**
**JIS B 8381: Fittings of flexible joint for pneumatics**

(2) Definition of flow-rate characteristics

Effective area ***S***: The cross-sectional area having an ideal throttle without friction deduced from the calculation of the pressure changes inside an air tank or without reduced flow when discharging the compressed air in a choked flow, from an equipment attached to the air tank. This is the same concept representing the "easy to run through" as sonic conductance ***C***.

(3) Formula for flow rate

When $\frac{P_2 + 0.1}{P_1 + 0.1} \leq 0.5$, **choked flow**

$$Q = 120 \times S\,(P_1 + 0.1)\sqrt{\frac{293}{273 + t}} \quad \cdots\cdots(3)$$

When $\frac{P_2 + 0.1}{P_1 + 0.1} > 0.5$, **subsonic flow**

$$Q = 240 \times S\,\sqrt{(P_2 + 0.1)\,(P_1 - P_2)}\sqrt{\frac{293}{273 + t}} \quad \cdots\cdots(4)$$

Conversion with sonic conductance ***C***:

$$S = 5.0 \times C \quad \cdots\cdots(5)$$

***Q*** : Air flow rate[dm³/min(ANR)], dm³ (cubic decimeter) of SI unit are also allowed to be described by L (liter) 1 dm³ = 1 L
***S*** : Effective area [mm²]
$P_1$ : Upstream pressure [MPa]
$P_2$ : Downstream pressure [MPa]
***t*** : Temperature [°C]

Note) Formula for subsonic flow (4) is only applicable when the critical pressure ratio ***b*** is the unknown equipment. In the formula (2) by the sonic conductance ***C***, it is the same formula as when ***b*** = 0.5.

(4) Test method

Attach a test equipment with the test circuit shown in Fig. (2) in order to discharge air into the atmosphere until the pressure inside the air tank goes down to 0.25 MPa (0.2 MPa) from an air tank filled with the compressed air at a certain pressure level (0.5 MPa) which does not go below 0.6 MPa. At this time, measure the discharging time and the residual pressure inside the air tank which had been left until it turned to be the normal values to determine the effective area ***S***, using the following formula. The volume of an air tank should be selected within the specified range by corresponding to the effective area of an equipment for test. In the case of JIS B 8373, 8374, 8375, 8379, 8381, the pressure values are in parentheses and the coefficient of the formula is 12.9.

$$S = 12.1\,\frac{V}{t}\log_{10}\left(\frac{P_s + 0.1}{P + 0.1}\right)\sqrt{\frac{293}{T}} \quad \cdots\cdots(6)$$

***S*** : Effective area [mm²]
***V*** : Air tank capacity [dm³]
***t*** : Discharging time [s]
$P_s$ : Pressure inside air tank before discharging [MPa]
***P*** : Residual pressure inside air tank after discharging [MPa]
***T*** : Temperature inside air tank before discharging [K]

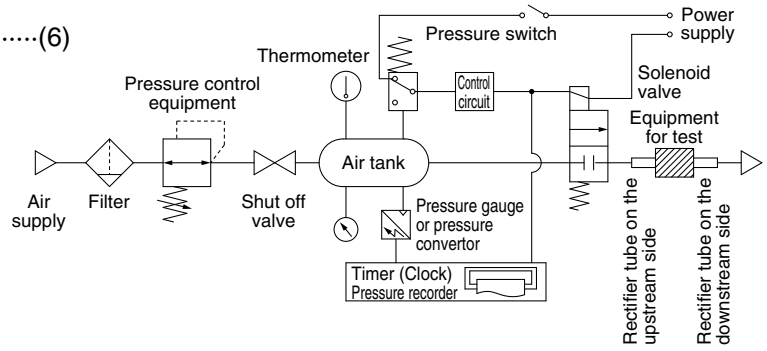



**Fig. (2) Test circuit based on JIS B 8390**

**2.3 Flow coefficient *Cv* factor**

**The United States Standard ANSI/(NFPA)T3.21.3: 1990: Pneumatic fluid power—Flow rating test procedure and reporting method for fixed orifice components**

Defines the ***Cv*** factor of flow coefficient by the following formula which is based on the test conducted by the test circuit analogous to ISO 6358.

$$Cv = \frac{Q}{114.5\sqrt{\frac{\Delta P\,(P_2 + P_a)}{T_1}}} \quad \cdots\cdots(7)$$

$\Delta P$ : Pressure drop between the static pressure tapping ports [bar]
$P_1$ : Pressure of the upstream tapping port [bar gauge]
$P_2$ : Pressure of the downstream tapping port [bar gauge]: $P_2 = P_1 - \Delta P$
$Q$ : Flow rate [dm³/s standard condition]
$P_a$ : Atmospheric pressure [bar absolute]
$T_1$ : Upstream absolute temperature [K]
Test conditions are < $P_1 + P_a$ = 6.5 ±0.2 bar absolute, $T_1$ = 297 ±5 K, 0.07 bar ≤ $\Delta P$ ≤ 0.14 bar.
This is the same concept as effective area ***A*** which ISO 6358 stipulates as being applicable only when the pressure drop is smaller than the upstream pressure and the compression of air does not become a problem.

## 3. Process fluid control equipment

(1) Conformed standard

**IEC60534-2-3: 1997: Industrial process control valves. Part 2: Flow capacity, Section Three-Test procedures**
**JIS B 2005: 1995: Test method for the flow coefficient of a valve**
**Equipment standards: JIS B 8471: Solenoid valve for water**
**JIS B 8472: Solenoid valve for steam**
**JIS B 8473: Solenoid valve for fuel oil**

(2) Definition of flow-rate characteristics

***Av*** factor: Value of the clean water flow rate represented by m³/s which runs through a valve (equipment for test) when the pressure difference is 1 Pa. It is calculated using the following formula.

$$Av = Q\sqrt{\frac{\rho}{\Delta P}} \quad \cdots\cdots(8)$$

$Av$ : Flow coefficient [m²]
$Q$ : Flow rate [m³/s]
$\Delta P$ : Pressure difference [Pa]
$\rho$ : Fluid density [kg/m³]

(3) Formula of flow rate

It is described by the practical units. Also, the flow-rate characteristics are shown in Graph (2).
In the case of liquid:

$$Q = 1.9 \times 10^6 Av\sqrt{\frac{\Delta P}{G}} \quad \cdots\cdots(9)$$

$Q$ : Flow rate [L/min]
$Av$ : Flow coefficient [m²]
$\Delta P$ : Pressure difference [MPa]
$G$ : Relative density [water = 1]

In the case of saturated aqueous vapor:

$$Q = 8.3 \times 10^6 Av\sqrt{\Delta P(P_2 + 0.1)} \quad \cdots\cdots(10)$$

$Q$ : Flow rate [kg/h]
$Av$ : Flow coefficient [m²]
$\Delta P$ : Pressure difference [MPa]
$P_1$ : Upstream pressure [MPa]: $\Delta P = P_1 - P_2$
$P_2$ : Downstream pressure [MPa]

Conversion of flow coefficient:

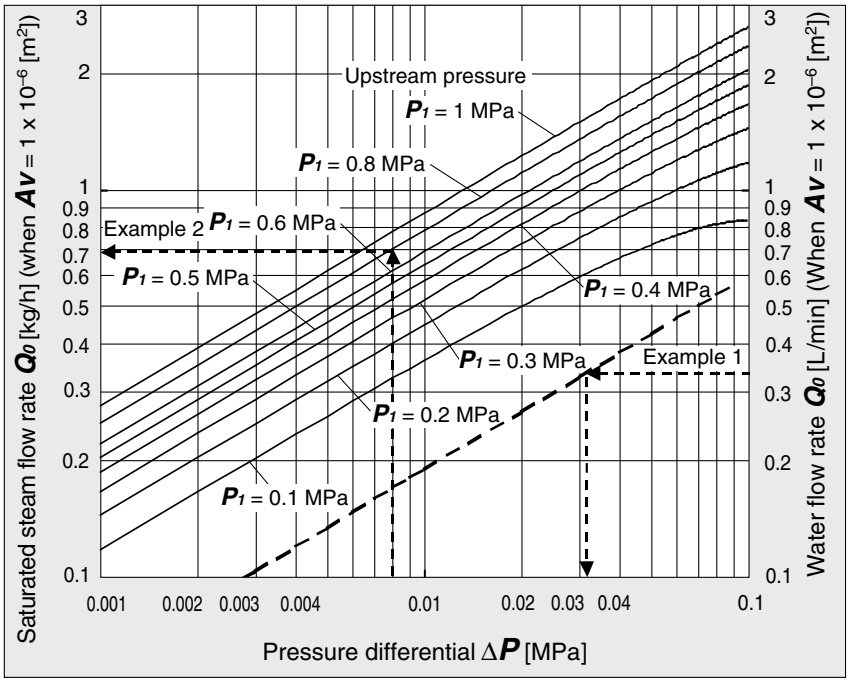
$Av = 28 \times 10^{-6}\ Kv = 24 \times 10^{-6}\ Cv$ ·····(11)

Here,

***Kv*** factor : Value of the clean water flow rate represented by $m^3/h$ which runs through a valve at 5 to 40°C, when the pressure difference is 1 bar.

***Cv*** factor (Reference values): Figures representing the flow rate of clean water by US gal/min which runs through a valve at 60°F, when the pressure difference is 1 $lbf/in^2$ (psi).

Value is different from ***Kv*** and ***Cv*** factors for pneumatic purpose due to different test method.




**Graph (2) Flow-rate characteristics**

Example 1)

Obtain the pressure difference when water 15 [L/min] runs through a solenoid valve with an $Av = 45 \times 10^{-6}$ [$m^2$]. Since $Q_0 = 15/45 = 0.33$ [L/min], according to Graph (2), if reading $\Delta P$ when $Q_0$ is 0.33, it will be 0.031 [MPa].

Example 2)

Obtain the saturated steam flow rate when $P_1 = 0.8$ [MPa], $\Delta P = 0.008$ [MPa] with a solenoid valve with an $Av = 1.5 \times 10^{-6}$ [$m^2$ ].

According to Graph (2), if reading $Q_0$ when $P_1$ is 0.8 and $\Delta P$ is 0.008, it is 0.7 [kg/h]. Hence, the flow rate $Q = 0.7 \times 1.5 = 1.05$ [kg/h].

(4) Test method

Attach a test equipment with the test circuit shown in Fig. (3). Next, pour water at 5 to 40°C, then measure the flow rate with a pressure difference of 0.075 MPa. However, the pressure difference needs to be set with a large enough difference so that the Reynolds number does not go below a range of $4 \times 10^4$ .

By substituting the measurement results for formula (8) to figure out ***Av***.

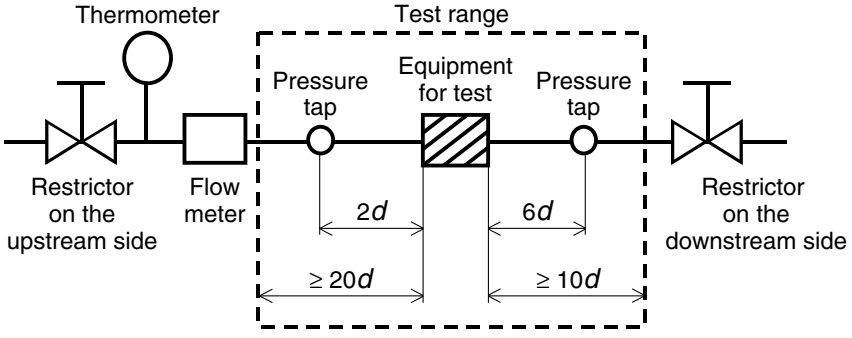
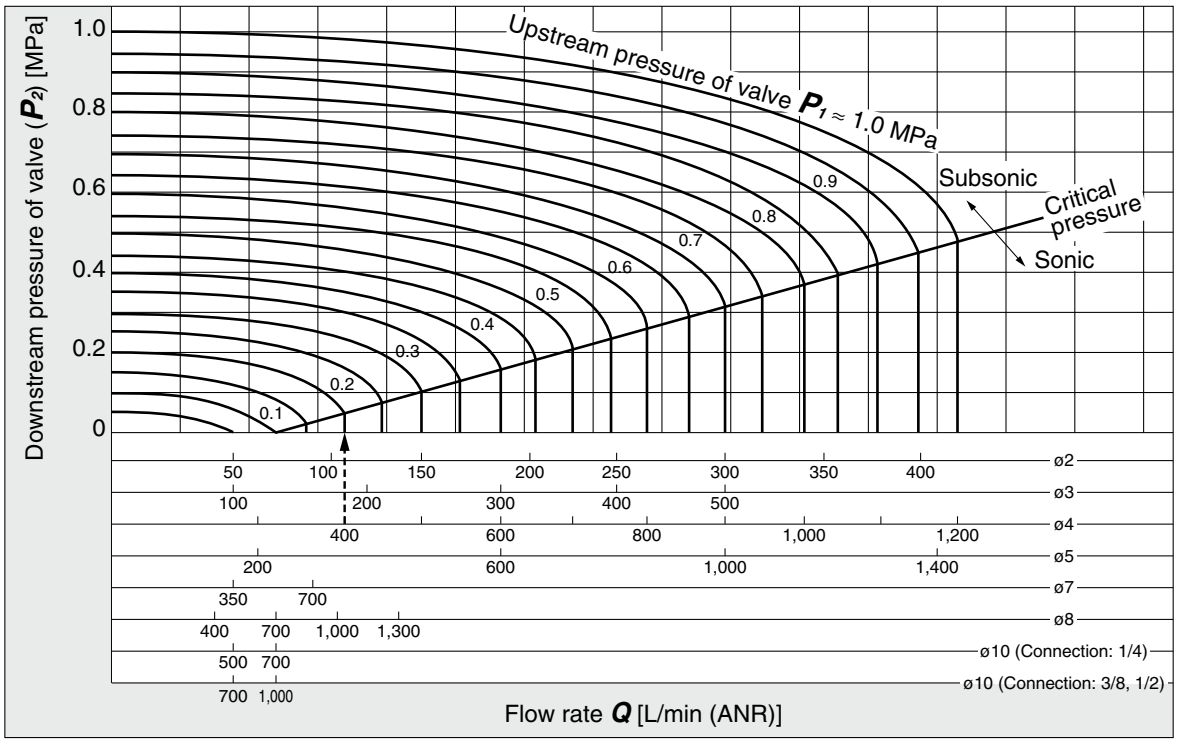



**Fig. (3) Test circuit based on IEC60534-2-3, JIS B 2005**

# Flow-rate Characteristics 1

Note) Use this graph as a guide. In the case of obtaining an accurate flow rate, refer to pages 38 through to 42.

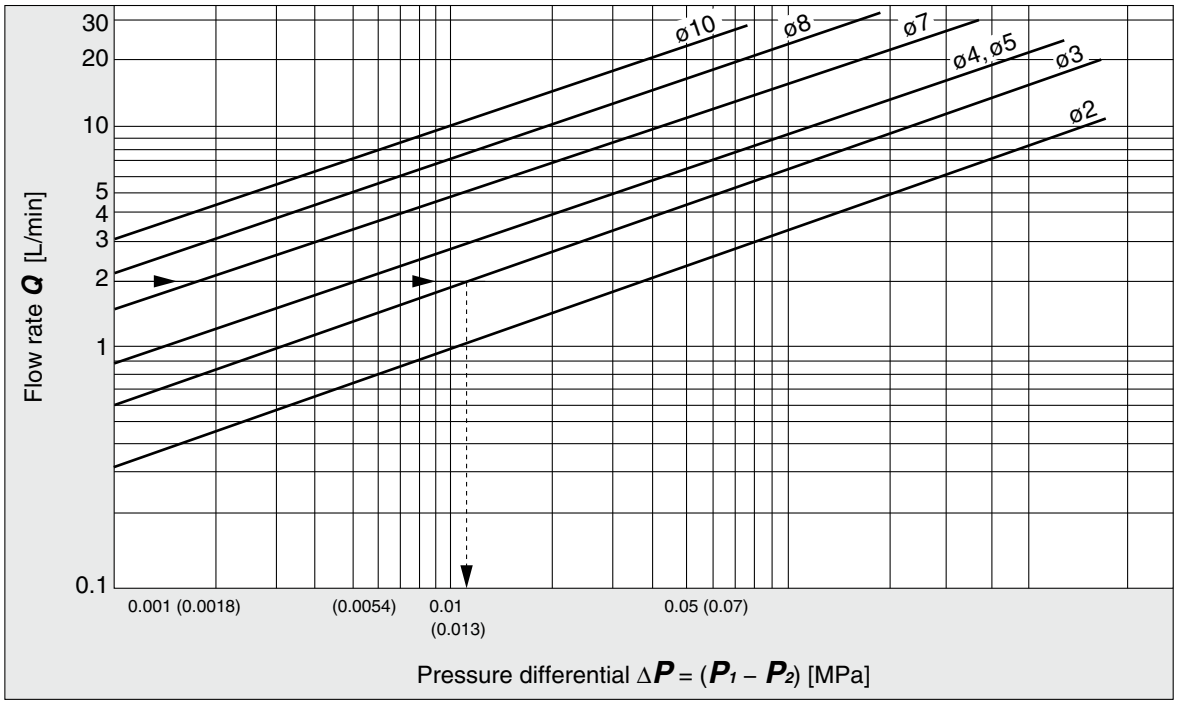
## For Air




### How to read the graph

The sonic range pressure to generate a flow rate of 400 L/min (ANR) is $P_1 \approx 0.2$ MPa for a ø4 orifice and $P_1 \approx 0.58$ MPa for a ø3 orifice.

## For Water



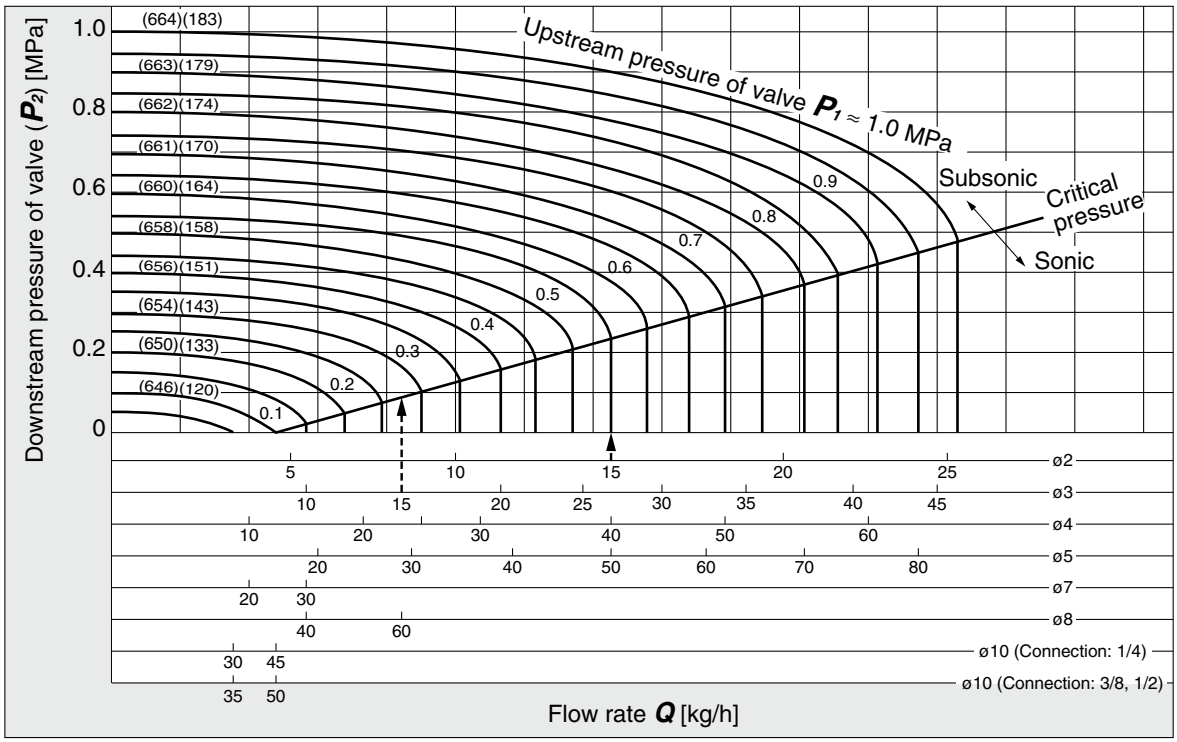

### How to read the graph

When a water flow of 2 L/min is generated, $\Delta P \approx 0.013$ MPa for a valve with ø3 orifice.

# Flow-rate Characteristics 2

Note) Use this graph as a guide. In the case of obtaining an accurate flow rate, refer to pages 38 through to 42.

## For Saturated Steam




### How to read the graph

The sonic range pressure to generate a flow rate of 15 kg/h is $P_1 \approx 0.55$ MPa for a ø2 orifice and $P_1 \approx 0.28$ MPa for a ø3 orifice.
The amount of potential heat varies somewhat based on the pressure $P_1$. At 15 kg/h, there will be approximately 9700 kcal/h of heat.

# Series VX21/22/23
# Specific Product Precautions 1

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## Design

## ⚠Warning

**1. Cannot be used as an emergency shutoff valve etc.**
The valves presented in this catalog are not designed for safety applications such as an emergency shutoff valve. If the valves are used in this type of system, other reliable safety assurance measures should also be adopted.

**2. Extended periods of continuous energization**
The solenoid coil will generate heat when continuously energized. Avoid using in a tightly shut container. Install it in a well ventilated area. Furthermore, do not touch it while it is being energized or right after it is energized.

**3. Liquid rings**
In cases with a flowing liquid, provide a bypass valve in the system to prevent the liquid from entering the liquid seal circuit.

**4. Actuator drive**
When an actuator, such as a cylinder, is to be driven using a valve, take appropriate measures to prevent potential danger caused by actuator operation.

**5. Pressure (including vacuum) holding**
It is not usable for an application such as holding the pressure (including vacuum) inside of a pressure vessel because air leakage is entailed in a valve.

**6. When the conduit type is used as equivalent to an IP65 enclosure, install a wiring conduit etc.**

**7. When an impact, such as water hammer etc., caused by the rapid pressure fluctuation is applied, the solenoid valve may be damaged. Give an attention to it.**

## Selection

## ⚠Warning

**1. Fluid**

**1) Type of fluid**
Before using a fluid, check whether it is compatible with the materials of each model by referring to the fluids listed in this catalog. Use a fluid with a kinematic viscosity of 50 $mm^2/s$ or less. If there is something you do not know, please contact SMC.

**2) Flammable oil, Gas**
Check the specifications for leakage in the interior and/or exterior area.

**3) Corrosive gas**
Cannot be used since it will lead to cracks by stress corrosion or result in other incidents.

**4)** When a brass body is used, then depending on water quality, corrosion and internal leakage may occur. If such abnormalities occur, exchange the product for a stainless steel body.

**5)** Use an oil-free specification when any oily particle must not enter the passage.

**6)** Applicable fluid on the list may not be used depending on the operating condition. Give adequate confirmation, and then determine a model, just because the compatibility list shows the general case.

## Selection

## ⚠Warning

**2. Fluid quality**

**<Air>**

**1) Use clean air.**
Do not use compressed air that contains chemicals, synthetic oils including organic solvents, salt or corrosive gases, etc., as it can cause damage or malfunction.

**2) Install an air filter.**
Install air filters close to the valves on the upstream side. A filtration degree of 5 μm or less should be selected.

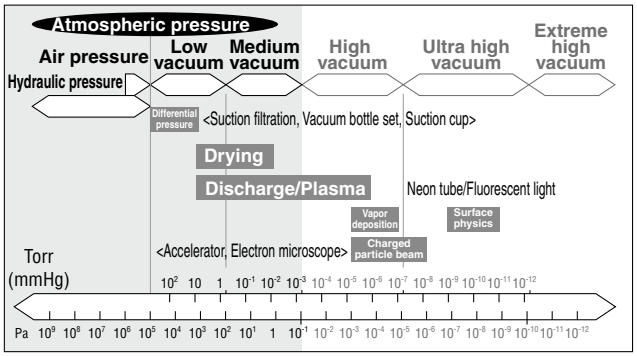
**3) Install an aftercooler or air dryer, etc.**
Compressed air that contains excessive drainage may cause malfunction of valves and other pneumatic equipment. To prevent this, install an aftercooler or air dryer, etc.

**4) If excessive carbon powder is generated, eliminate it by installing mist separators at the upstream side of valves.**
If excessive carbon powder is generated by the compressor, it may adhere to the inside of the valves and cause a malfunction.

Refer to Best Pneumatics No.5 for further details on compressed air quality.

**<Vacuum>**

Please be aware that there is a range of pressure that can be used.




Vacuum piping direction: if the system uses a vacuum pump, we ask that you install the vacuum pump on the secondary side.

Also, install a filter on the primary side, and be careful that no foreign object is picked up.

Please replace the valve after operating the device approximately 300,000 times.

# Series VX21/22/23
# Specific Product Precautions 2

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## Selection

## ⚠Warning

**<Water>**

The use of a fluid that contains foreign objects can cause problems such as malfunction and seal failure by promoting wear of the valve seat and armature and by sticking to the sliding parts of the armature etc. Install a suitable filter (strainer) immediately upstream from the valve. As a general rule, use 100 mesh.

The supply water includes materials that create a hard sediment or sludge such as calcium and magnesium. Since this scale and sludge can cause the valve to malfunction, install water softening equipment, and a filter (strainer) directly upstream from the valve to remove these substances.

**Tap water pressure:**

The water pressure for tap water is normally 0.4 MPa or less. However, in places like a high-rise building, the pressure may be 1.0 MPa. When selecting tap water, be careful of the maximum operating pressure differential.

When using water or heated water, poor operation or leaks may be caused by dezincification, erosion, corrosion, etc. The brass (C37) body of this product uses dezincification resistant material as a standard. We also offer a stainless steel body type with improved corrosion resistance. Please use the one that fits your needs.

**<Oil>**

Generally, FKM is used as seal material, as it is resistant to oil. The resistance of the seal material may deteriorate depending on the type of oil, manufacturer or additives. Check the resistance before using. The kinematic viscosity must not exceed 50 $mm^2/s$.

**<Steam>**

The use of a steam that contains foreign objects can cause problems such as malfunction and seal failure by promoting wear of the valve seat and armature, and by sticking to the sliding parts of the armature etc. Install a suitable filter (strainer) immediately upstream from the valve.

As a standard, the mesh count for the strainer is 100 mesh. However, the size and shape of foreign objects that occur depends on the operating environment. Check the fluid status and choose an appropriate mesh count.

The supply water to a boiler includes materials that create a hard sediment or sludge such as calcium and magnesium.

Sediment and sludge from steam can cause the valve to not operate properly. Install a water softening device, which removes these materials. Do not use operation steam which contains chemicals, synthetic oils containing organic solvents, salts or corrosive gases, etc., as these can cause damage or deterioration.

**3. Ambient environment**

Use within the operable ambient temperature range. Check the compatibility between the product's composition materials and the ambient atmosphere. Be certain that the fluid used does not touch the external surface of the product.

**4. Countermeasures against static electricity**

Take measures to prevent static electricity since some fluids can cause static electricity.

## Selection

## ⚠Warning

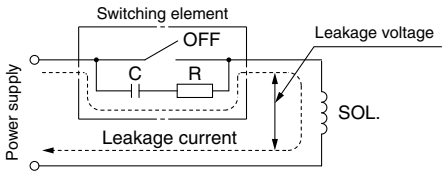
**5. Low temperature operation**

1) The valve can be used in an ambient temperature of between –20 to –10°C. However, take measures to prevent freezing or solidification of impurities, etc.
2) When using valves for water application in cold climates, take appropriate countermeasures to prevent the water from freezing in tubing after cutting the water supply from the pump, by draining the water etc. When warming by a heater etc., be careful not to expose the coil portion to a heater. Installation of a dryer, heat retaining of the body is recommended to prevent a freezing condition in which the dew point temperature is high and the ambient temperature is low, and the high flow runs.

## ⚠Caution

**1. Leakage voltage**

Particularly when using a resistor in parallel with a switching element and using a C-R element (surge voltage suppressor) to protect the switching element, take note that leakage current will flow through the resistor, C-R element, etc., creating a possible danger that the valve may not turn off.




AC coil: 5% or less of rated voltage
DC coil: 2% or less of rated voltage

**2. Selecting model**

Material depends on fluid. Select optimal models for the fluid.

**3. When the fluid is oil.**

The kinematic viscosity must not exceed 50 $mm^2/s$.

## Mounting

## ⚠Warning

**1. If air leakage increases or equipment does not operate properly, stop operation.**

After mounting is completed, confirm that it has been done correctly by performing a suitable function test.

**2. Do not apply external force to the coil section.**

When tightening is performed, apply a wrench or other tool to the outside of the piping connection parts.

**3. Mount a valve with its coil position upward, not downward.**

When mounting a valve with its coil positioned downward, foreign objects in the fluid will adhere to the iron core leading to a malfunction. Especially for strict leakage control, such as with vacuum applications and non-leak specifications, the coil must be positioned upward.

**4. Do not warm the coil assembly with a heat insulator etc.**

Use tape, heaters, etc., for freeze prevention on the piping and body only. They can cause the coil to burn out.

# Series VX21/22/23
# Specific Product Precautions 3

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## Mounting

## ⚠Warning

**5. Secure with brackets, except in the case of steel piping and copper fittings.**

**6. Avoid sources of vibration, or adjust the arm from the body to the minimum length so that resonance will not occur.**

**7. Painting and coating**

Warnings or specifications printed or labeled on the product should not be erased, removed or covered up.

## Disassembly/Assembly Procedures

## ⚠Caution

**1. Before starting the disassembly work, be sure to shut off the power supply and pressure supply, and then release the residual pressure.**

### Disassembly

**<N.C.>**

1) Loosen the mounting screws.
The coil assembly, seal, return spring, armature assembly and body can be removed.

**<N.O.>**

1) Loosen the mounting screws.
The coil assembly, push rod assembly, O-rings, adapter and body can be removed.

### Assembly

**<Common to N.C. and N.O.>**

1) Mount the components on the body in the reverse order of disassembly.
2) When changing the electrical entry direction, turn the coil assembly in a desired direction to mount it.
3) Push the coil assembly against the body and tighten the screws two or more rounds diagonally (Fig. 2) in the status that there are no gaps between the coil assembly and body (Fig. 1).
Tighten the screws in the order of "1→2→3→4→1→2→3→4".

**Proper Tightening Torque** (N·m)

| | |
|---|---|
| VX21 | 0.5 |
| VX22 | 0.7 |
| VX23 | |

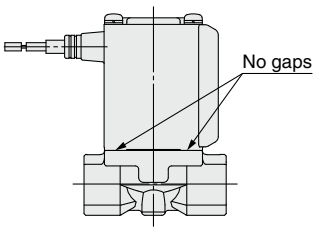



Fig.1

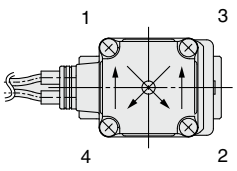


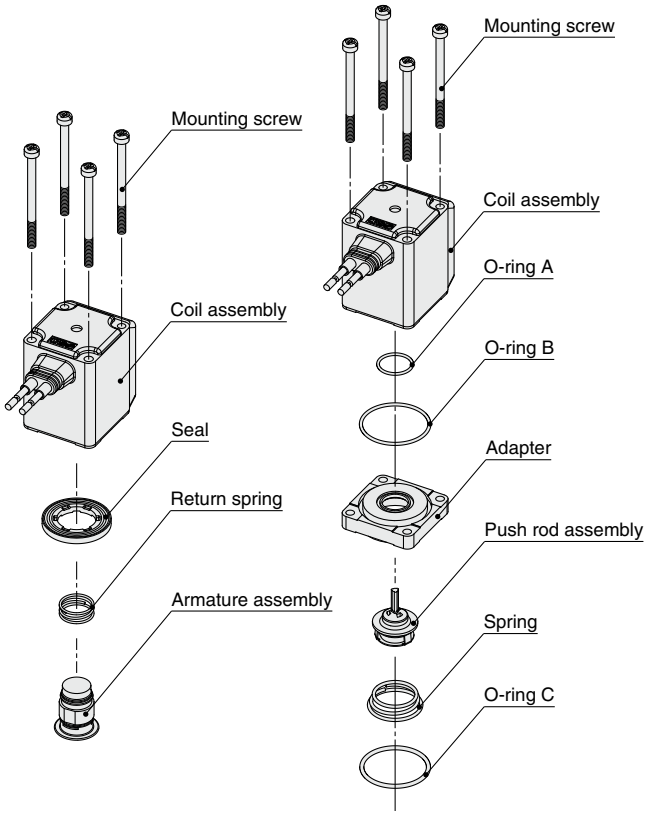

Fig.2

∗ After tightening the screws, make sure that there are no gaps between the coil and body (Fig. 1).
∗ After the disassembly and assembly have been completed, make sure that no leak occurs from the seal. Additionally, when restarting the valve, make sure that the valve operates correctly after checking the safety.

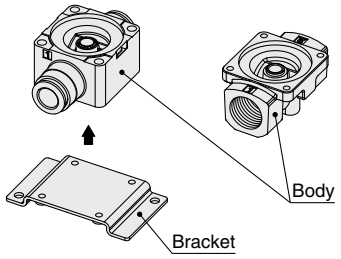
## Disassembly/Assembly Procedures

## ⚠Caution

**<N.C.>** **<N.O.>**




**Resin body** **Metal body (Aluminum / C37 / Stainless steel)**



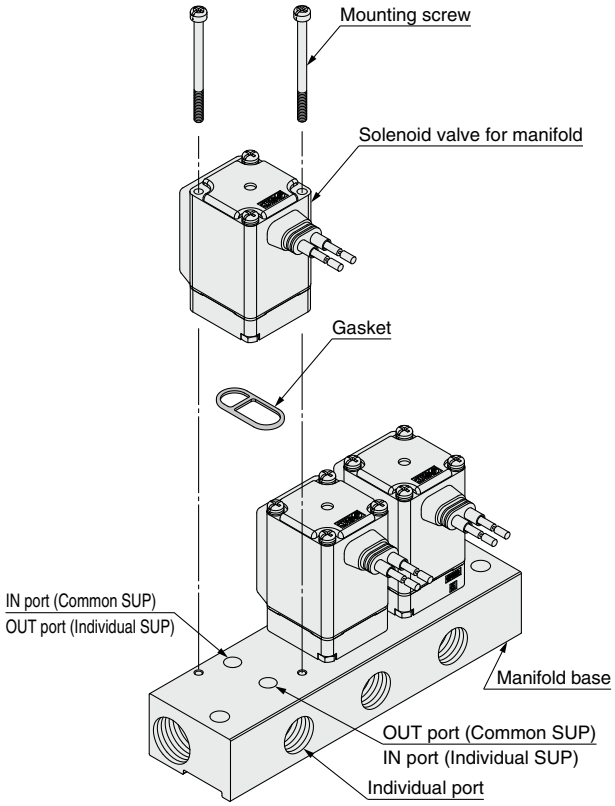
# Specific Product Precautions 4

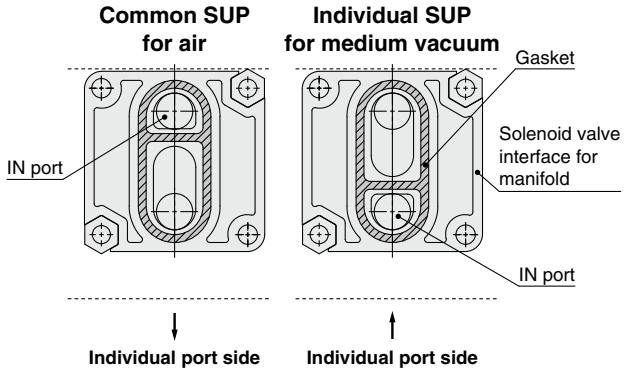
**Be sure to read this before handling.**
**Refer to the back cover for Safety Instructions. For 2 Port Solenoid Valves for Fluid Control Precautions, refer to "Handling Precautions for SMC Products" and the Operation Manual on SMC website, http://www.smcworld.com**

## Disassembly/Assembly Procedures

### ⚠Caution

**Manifold Exploded View**




∗ Mounting orientation exists when mounting valves onto manifold base. Mount it as shown above.
∗ Take great care when special electrical entry direction (XC) is used.

## Piping

### ⚠Warning

**1. During use, deterioration of the tube or damage to the fittings could cause tubes to come loose from their fittings and thrash about.**

To prevent uncontrolled tube movement, install protective covers or fasten tubes securely in place.

**2. For piping the tube, fix the product securely using the mounting holes so that the product is not in the air.**

### ⚠Caution

**1. Preparation before piping**

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe. Avoid pulling, compressing, or bending the valve body when piping.

**2. Avoid connecting ground lines to piping, as this may cause electric corrosion of the system.**

**3. Always tighten threads with the proper tightening torque.**

When using steel piping, tighten with the proper tightening torque shown below.
Lower tightening torque will lead into fluid leakage.

**Tightening Torque for Piping**

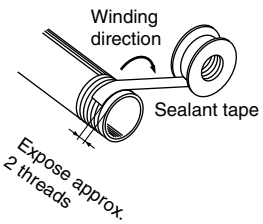
| Thread size | Proper tightening torque (N·m) |
|---|---|
| Rc1/8 | 7 to 9 |
| Rc1/4 | 12 to 14 |
| Rc3/8 | 22 to 24 |
| Rc1/2 | 28 to 30 |

**4. Connection of piping to products**

When connecting piping to a product, avoid mistakes regarding the supply port etc.

**5. Wrapping of sealant tape**

When connecting pipes, fittings, etc., be sure that chips from the pipe threads and sealing material do not enter the valve.
Furthermore, when sealant tape is used, leave 1.5 to 2 thread ridges exposed at the end of the threads.




**6. In applications such as vacuum and non-leak specifications, use caution specifically against the contamination of foreign objects or airtightness of the fittings.**

# Specific Product Precautions 5

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## Recommended Piping Conditions

**1. When connecting tubes using One-touch fittings, provide some spare tube length shown in Fig. 1, recommended piping configuration.**
Also, do not apply external force to the fittings when binding tubes with bands etc. (see Fig. 2.)

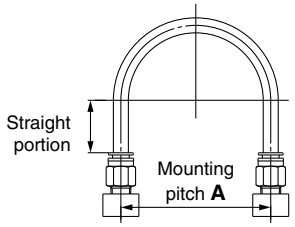



**Fig. 1 Recommended piping configuration**

Unit: mm

| Tube size | Mounting pitch **A** | | | Straight portion length |
|---|---|---|---|---|
| | Nylon tubing | Soft nylon tubing | Polyurethane tubing | |
| ø1/8" | 44 or more | 29 or more | 25 or more | 16 or more |
| ø6 | 84 or more | 39 or more | 39 or more | 30 or more |
| ø1/4" | 89 or more | 56 or more | 57 or more | 32 or more |
| ø8 | 112 or more | 58 or more | 52 or more | 40 or more |
| ø10 | 140 or more | 70 or more | 69 or more | 50 or more |
| ø12 | 168 or more | 82 or more | 88 or more | 60 or more |

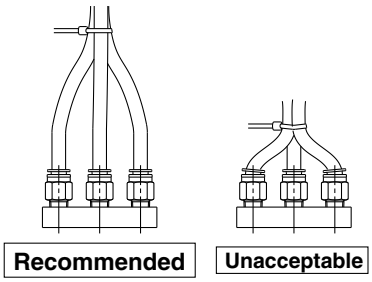



**Fig. 2 Binding tubes with bands**

## Wiring

### ⚠Warning

**1. Do not apply AC voltage to Class "H" coil AC type unless it is built in full-wave rectifier, or the coil will be damaged.**

### ⚠Caution

**1. As a rule, use electrical wire with a cross sectional area of 0.5 to 1.25 mm$^2$ for wiring.**
**Furthermore, do not allow excessive force to be applied to the lines.**

**2. Use electrical circuits which do not generate chattering in their contacts.**

**3. Use voltage which is within ±10% of the rated voltage. In cases with a DC power supply where importance is placed on responsiveness, stay within ±5% of the rated value. The voltage drop is the value in the lead wire section connecting the coil.**

**4. When a surge from the solenoid affects the electrical circuitry, install a surge voltage suppressor etc., in parallel with the solenoid. Or, adopt an option that comes with the surge voltage protection circuit. (However, a surge voltage occurs even if the surge voltage protection circuit is used. For details, please consult with SMC.)**

# Series VX21/22/23
# Specific Product Precautions 6

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## Operating Environment

## ⚠Warning

1. **Do not use in an atmosphere having corrosive gases, chemicals, sea water, water, water steam, or where there is direct contact with any of these.**
2. **Do not use in explosive atmospheres.**
3. **Do not use in locations subject to vibration or impact.**
4. **Do not use in locations where radiated heat will be received from nearby heat sources.**
5. **Employ suitable protective measures in locations where there is contact with water droplets, oil or welding spatter, etc.**

## Maintenance

## ⚠Warning

**1. Removing the product**
The valve will reach a high temperature when used with high temperature fluids. Confirm that the valve temperature has dropped sufficiently before performing work. If touched inadvertently, there is a danger of being burned.
1) Shut off the fluid supply and release the fluid pressure in the system.
2) Shut off the power supply.
3) Dismount the product.

**2. Low frequency operation**
Switch valves at least once every 30 days to prevent malfunction. Also, in order to use it under the optimum state, conduct a regular inspection once a half year.

## ⚠Caution

**1. Filters and strainers**
1) Be careful regarding clogging of filters and strainers.
2) Replace filter elements after one year of use, or earlier if the pressure drop reaches 0.1 MPa.
3) Clean strainers when the pressure drop reaches 0.1 MPa.

**2. Lubrication**
When using after lubricating, never forget to lubricate continuously.

**3. Storage**
In case of long term storage after use, thoroughly remove all moisture to prevent rust and deterioration of rubber materials etc.

**4. Exhaust the drainage from an air filter periodically.**

## Operating Precautions

## ⚠Warning

1. **If there is a possibility of reverse pressure being applied to the valve, take countermeasures such as mounting a check valve on the downstream side of the valve.**
2. **When problems are caused by a water hammer, install water hammer relief equipment (accumulator etc.), or use an SMC water hammer relief valve (Series VXR). For details, please consult with SMC.**

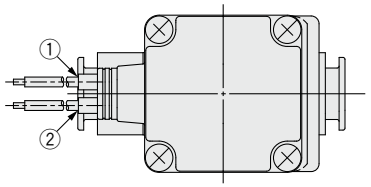
## Electrical Connections

## ⚠Caution

### ■ Grommet

Class B coil: AWG20 Insulator O.D. 2.5 mm

Class H coil: AWG18 Insulator O.D. 2.1 mm

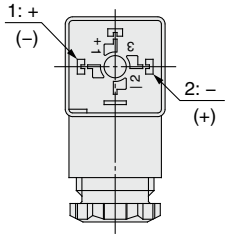



| Rated voltage | Lead wire color | |
|---|---|---|
| | ① | ② |
| DC | Black | Red |
| 100 VAC | Blue | Blue |
| 200 VAC | Red | Red |
| Other AC | Gray | Gray |

∗ There is no polarity.

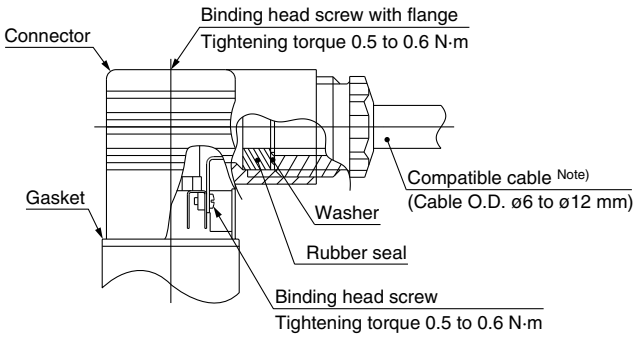
### ■ DIN terminal

Since internal connections are shown below for the DIN terminal, make connections to the power supply accordingly.




| Terminal no. | 1 | 2 |
|---|---|---|
| DIN terminal | + (–) | – (+) |

∗ There is no polarity.
• Use compatible heavy duty cords with cable O.D. ø6 to ø12 mm.
• Use the tightening torques below for each section.




Note) For an outside cable O.D. ø9 to ø12 mm, remove the internal parts of the rubber seal before using.

# Specific Product Precautions 7

**Be sure to read this before handling.**
**Refer to the back cover for Safety Instructions. For 2 Port Solenoid Valves for Fluid Control Precautions, refer to "Handling Precautions for SMC Products" and the Operation Manual on SMC website, http://www.smcworld.com**

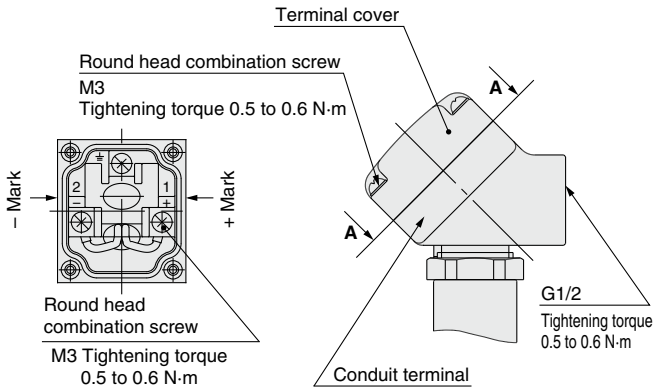
## Electrical Connections

### ⚠Caution

**■ Conduit terminal**

In the case of the conduit terminal, make connections according to the marks shown below.

- Use the tightening torques below for each section.
- Properly seal the terminal connection (G1/2) with the special wiring conduit etc.



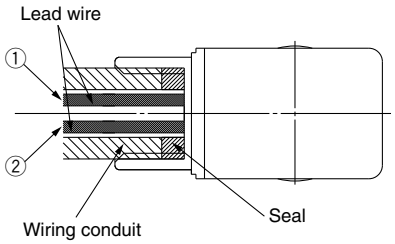

**View A-A**

(Internal connection diagram)

**■ Conduit**

When used as an IP65 equivalent, use seal to install the wiring conduit. Also, use the tightening torque below for the conduit.

Class B coil: AWG20 Insulator O.D. 2.5 mm
Class H coil: AWG18 Insulator O.D. 2.1 mm




(Bore size G1/2 Tightening torque 0.5 to 0.6 N·m)

| Rated voltage | Lead wire color | |
|---|---|---|
| | ① | ② |
| DC | Black | Red |
| 100 VAC | Blue | Blue |
| 200 VAC | Red | Red |
| Other AC | Gray | Gray |

∗ There is no polarity.

| Description | Part no. |
|---|---|
| Seal | VCW20-15-6 |

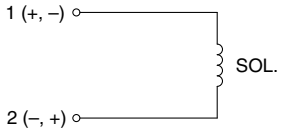
Note) Please order separately.

## Electrical Circuits

### ⚠Caution

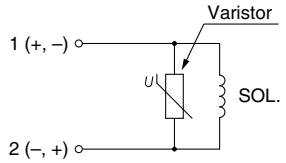
**[DC circuit]**

**Grommet, Flat terminal**



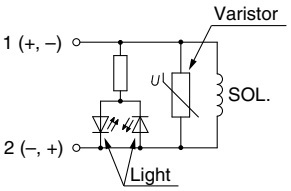

Without electrical option

**Grommet, DIN terminal, Conduit terminal, Conduit**




With surge voltage suppressor

**DIN terminal, Conduit terminal**

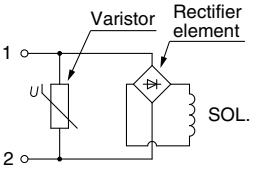



With light/surge voltage suppressor

**[AC circuit]**

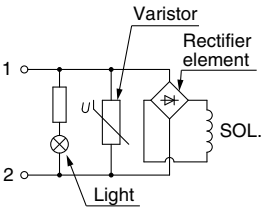
∗ For AC (Class B), the standard product is equipped with surge voltage suppressor.

**Grommet, DIN terminal, Conduit terminal, Conduit**




Without electrical option

**DIN terminal, Conduit terminal**




With light/surge voltage suppressor

## One-touch Fitting

### ⚠Caution

**For information on handling One-touch fittings and appropriate tubing, refer to page 48 and the KQ2 series One-touch fittings in Best Pneumatics No. 6.**
**The KQ2 series information can be downloaded from the following SMC website, http://www.smcworld.com**

# ⚠ Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of **"Caution," "Warning"** or **"Danger."** They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

**⚠ Caution:** **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

**⚠ Warning:** **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

**⚠ Danger :** **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines.
(Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots – Safety.
etc.

## ⚠ Warning

**1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.**

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

**2. Only personnel with appropriate training should operate machinery and equipment.**

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

**3. Do not service or attempt to remove product and machinery/ equipment until safety is confirmed.**

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

**4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.**

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

## ⚠ Caution

**1. The product is provided for use in manufacturing industries.**

The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

## Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".
Read and accept them before using the product.

### Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.*2)
   Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

***2) Vacuum pads are excluded from this 1 year warranty.**
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

### Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

## ⚠ Caution

**SMC products are not intended for use as instruments for legal metrology.**

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

**Revision history**

**Edition B**
* Added N.O. valve.
* Added steam as a fluid (Insulation type Class H).
* Added manifold.
* Increased pages from 32 to 48. QV

**Edition C**
* Added installation options.
* Added disassembly/assembly procedures.
* Leakage voltage (AC coil) was corrected from 10% or less to 5% or less.
* Increased pages from 48 to 52. RX

**Edition D**
* Faston terminal is changed to flat terminal.
* Added UL-compliant (For Air/Water).
* Increased pages from 52 to 56. SZ